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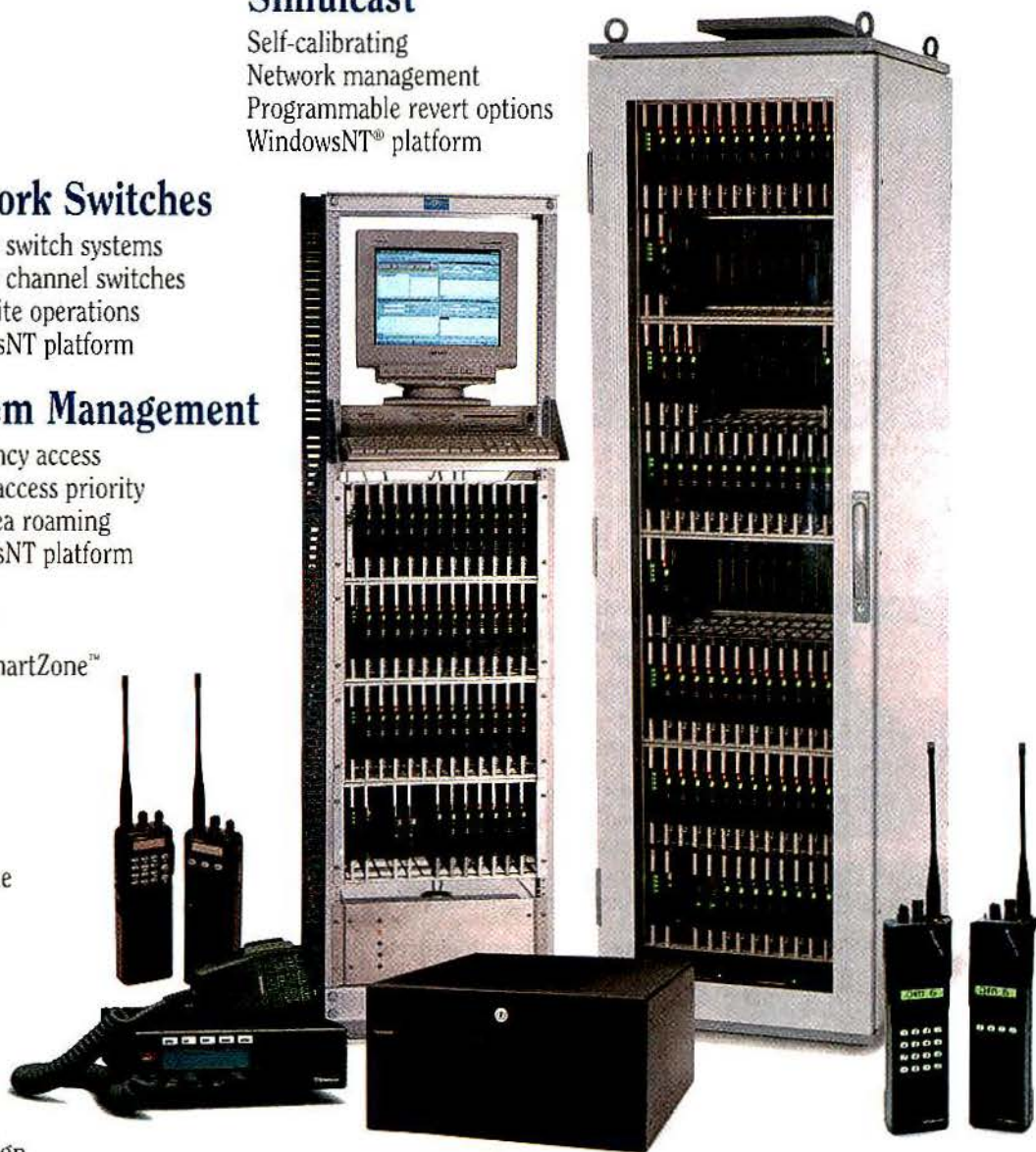
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October 1999



**On the cover:** Mobile radio continues to support military operations and logistics functions. See stories page 26 and 30. Cover design by Scott Dolash, art director. Photography by Donald E. Koehler.

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## Scanning . . .

Congratulations to Thera Bradshaw, the new second vice president of the Association of Public-Safety Communications Officials—International (APCO). She was elected at the organization's August national conference in Minneapolis. Bradshaw will advance, one year at a time, to first vice president, president-elect and president.

At least two trade associations, APCO and the National Emergency Number Association (NENA), represent employees of public safety agencies involved in telecommunications. The Texas APCO and NENA chapters work together to conduct a combined state convention. APCO and NENA have about 30% of their members in common.

Yet, the associations sometimes find themselves on opposite sides of an issue. NENA, for example, wants to keep the Phase II wireless telephone location standard as it is—with location information developed by the network—and APCO wants to consider modifying the standard to allow location information to be provided by the wireless telephone handset.

In 1995, Bradshaw served as president of NENA. Her acceptance by both organizations may help when opportunities arise for the two to cooperate in adopting similar proposals for government and industry consideration. She envisions cooperation beyond national borders, though: "I want to further our goals through others building strong partnerships around the world with government and industry organizations," she said.

Meanwhile, Glen Nash moves up to first vice president; Lyle Gallagher moves up to president-elect; and Joe Hanna advances to president of APCO, as Jack Keating finishes his year as president and four years on the board of officers. Congratulations to the officers moving up and to Keating on his completion of service on the board.

Lex Lutter, chief of the Tulsa Airport's Information and Communications Section, was not successful in his bid for second vice president. The association has benefited from the time he has volunteered for association committees, task forces and conferences during his 10 years in APCO.

### Enter 'Securicor Wireless'

What changes are in the offing for Intek Global, now that it has become a subsidiary of Securicor?

Securicor has been Intek Global's backseat driver since it acquired 62% of the company's shares in December 1996. Roger Wiggs, Securicor's chief executive, installed Robert Shiver on Intek Global's board of directors and then moved him up to chief executive in 1997. Under rules for governance of public U.S. companies, Securicor's management wasn't supposed to pick up the phone and ask (or tell) Intek



Global's managers what to do. It had to relay instructions through its board members, otherwise it would be riding roughshod over Intek Global's minority shareholders. Now, Securicor can direct Intek Global's operations as closely as it wants. In fact, the company name is slated to be changed to Securicor Wireless.

One step taken right after Securicor bought the remaining shares was to reduce employment at Intek Global's Kansas City, MO, operations center and among the sales force in the field. An estimated 28 employees were let go.

Intek Global emphasizes system equipment and airtime sales. Whether it will further reduce or divest its product distribution business is uncertain. The company sells products under the Intek Global, Midland, Roamer One and Data Express brands. The Midland line primarily is conventional FM two-way radios and accessories, and it has been the subject of acquisition rumors for many months. The company has scaled back its direct promotion of the equipment in favor of its alliance with National Rural

Telecommunications Cooperative utility company members to resell Roamer One equipment and airtime.

In fact, hints of a possible consolidation involving several companies' well-known radio equipment manufacturing divisions continued until press time. One seemed imminent, but our calls were deflected to the company's public relations representative. Can you imagine? They weren't willing to tell us because, if there is a deal—and we're not saying there is—it isn't final. All we were going to do is to tell you.

### James Kay prevails

It isn't always easy to beat the feds. But if you have the time, temperament and money to pay the lawyers, you might be able to pull it off.

Chief Administrative Law Judge Joseph Chachkin resolved all of the FCC's actions against James A. Kay in Kay's favor. He ordered that Kay's 152 Part 90 licenses in the Los Angeles area not be revoked, overturning a previous FCC order. He directed the FCC to lift a five-year freeze it had placed on processing Kay's license applications.

Regarding the FCC charge that Kay misrepresented the facts, the judge wrote: "It is concluded that the issue, *contrived by the Bureau*, is without substance." (Our italics. "Bureau" refers to the FCC's Private Radio Bureau, which since has become a part of the Wireless Telecommunications Bureau.)

Judge Chachkin found that the Bureau itself concealed critical information. He wrote: "This judge has never seen prosecutorial misconduct of this magnitude in the 20 years he has presided over commission cases. Such misconduct cannot be countenanced. It is completely contrary to the commission's duty and responsibility to treat its licensees in a fair and even-handed manner."

No one claims Kay is a saint. Yet his treatment at the hands of the FCC has been deplorable. He prevailed, but at an enormous cost. It's good to see the judge take a clear look at the record and state his conclusions so plainly. This month's "FCC Notes" includes some additional coverage.

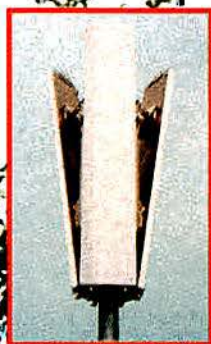
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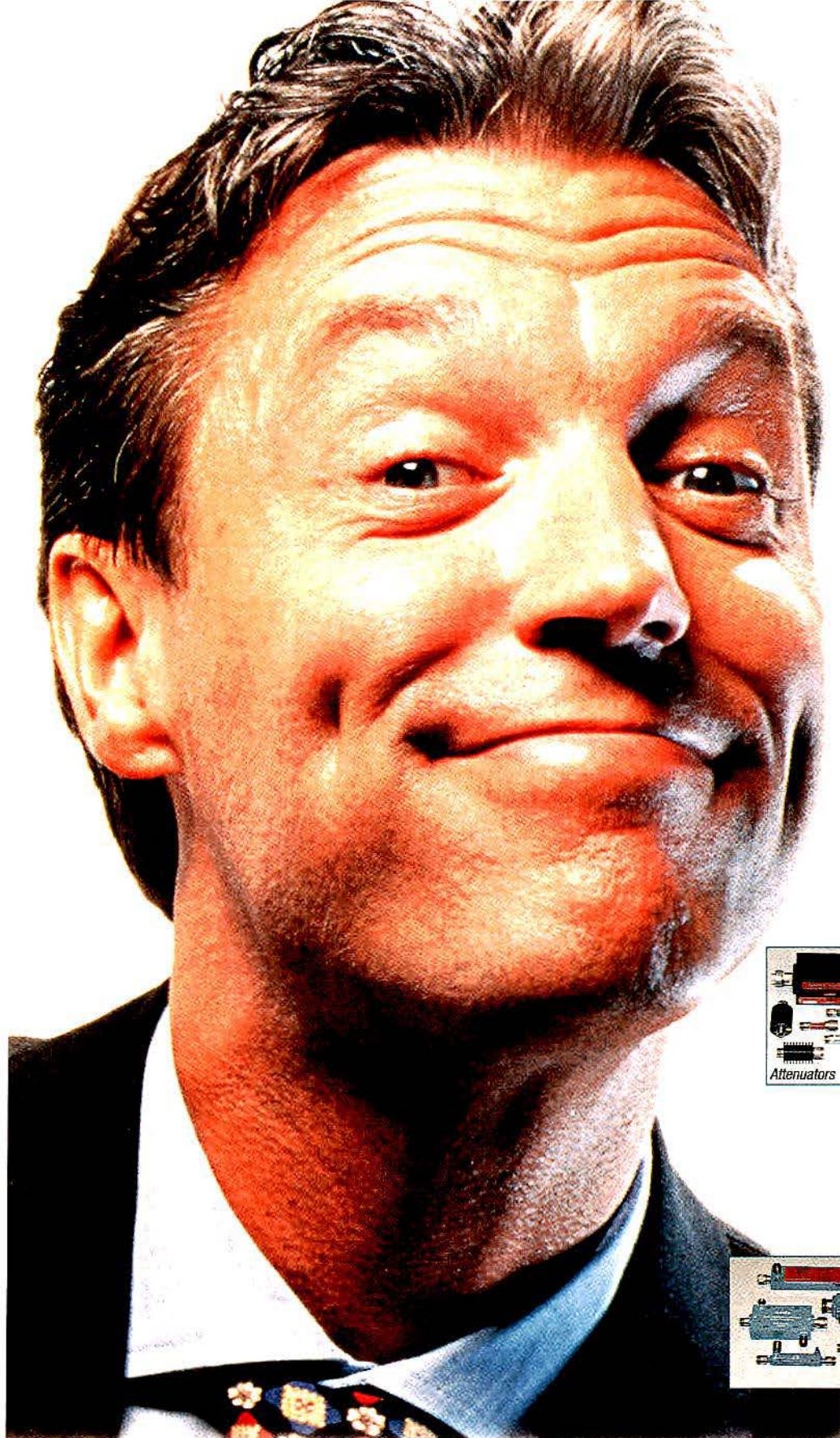
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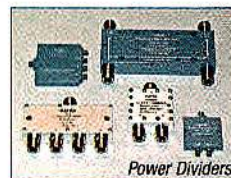




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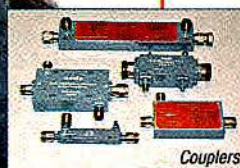
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## October

**12-13: Advanced RF Safety Training**, sponsored by RF Emission Measurements, Richardson, TX. Contact: 817-312-5363.

**14-15: Small Business in Telecommunications National Conference**, Regal River Front Hotel and Convention Center, St. Louis. Contact: 520-423-2205.

**18-21: Annual APCO Canada Conference**, sponsored by APCO, New Brunswick, Canada. Contact: Jim Flanagan at 888-226-2726.

**25-26: Annual Telecom Summit**, sponsored by The Strategis Group, Hyatt Regency Gainey Ranch, Scottsdale, AZ. Contact: 202-530-7602.

**27-30: Industrial Telecommunication Association/USMSS Joint Conference**, sponsored by ITA and USMSS, Grand Hyatt, Washington. Contact: 703-528-5115 or Web site [www.ita-relay.com](http://www.ita-relay.com).

## November

**1-4: Telecommunications Resellers Association Fall Conference and Exposition**, sponsored by TRA, Dallas. Contact: 202-835-9898 or Web site [www.tra.org](http://www.tra.org).

**2-4: Wireless I.T.**, sponsored by the Cellular Telecommunications Industry Association, Santa Clara Convention Center, Silicon Valley, CA. Contact: 202-785-2842 or Web site [www.wow-com.com](http://www.wow-com.com).

**8-9: ENTELEC & UTC Joint Fall Seminar**, JW Marriott, Houston. Contact: 888-503-8700 or email [entelec@pdq.net](mailto:entelec@pdq.net).

**10-14: Communications Marketing Conference**, sponsored by the Communications Marketing Association, Harvey Hotel, Dallas. Contact: Jack Armstrong, 410-308-0808.

**15-16: AMTEX**, sponsored by the American Mobile Telecommunications Association, Hilton, Walt Disney World Village, Lake Buena Vista, FL. Contact: 202-331-7773 or Web site [www.amtausa.org](http://www.amtausa.org).

**15-16: Fourth International Congress on Commercial Trunked Radio**, sponsored by the International Mobile Telecommunications Association, Hilton, Walt Disney World Village, Lake Buena Vista, FL. Contact: 202-331-7773.

**16-17: Advanced RF Safety Training**, sponsored by RF Emission Measurements, Southlake, TX. Contact: 817-312-5363.

**17-19: TelecomLatina**, co-sponsored by *Mobile Radio Technology*, Miami Beach Convention Center, Miami. Contact: 800-288-8606 or Web site [www.telecomlatina.com](http://www.telecomlatina.com).

**19: Radio Club of America Communications Symposium, 91st Anniversary Dinner and Awards Presentation**, New York Athletic Club, New York. Contact: Gerri Hopkins, 732-842-5070.

## 2000

### February

**28-March 1: Wireless 2000**, sponsored by the Cellular Telecommunications Industry Association, Ernest Morial Convention Center, New Orleans. Contact: 202-785-0081 or Web site [www.wow-com.com](http://www.wow-com.com).

### March

**19-22: ENTELEC**, sponsored by ENTELEC, Dallas Convention Center, Dallas. Contact: 281-357-8700 or Web site [www.entelec.org](http://www.entelec.org).

**22-24: International Wireless Communications Expo**, co-sponsored by *Mobile Radio Technology*,

Las Vegas Convention Center, Las Vegas. Contact: 800-288-8606.

## May

**8-11: Telecommunications Resellers Association Spring Conference and Exposition**, Philadelphia Marriott. Contact: 202-835-9898 or Web site [www.tra.org](http://www.tra.org).

**15-18: Spring Vehicular Technology Conference**, sponsored by IEEE Vehicular Technology Society, Hotel Pacific Tokyo, Tokyo. Contact: 81-468-40-3552 or email [matumoto@mars.yrp.nttdocomo.co.jp](mailto:matumoto@mars.yrp.nttdocomo.co.jp).

**30-June 1: Canadian Wireless**, sponsored by the Canadian Wireless Telecommunications Association, Toronto, Canada. Contact: 613-233-4888, ext. 102, or Web site [www.cwta.ca](http://www.cwta.ca).

## June

**4-8: Supercomm**, sponsored by TIA and USTA, Georgia World Congress Center, Atlanta. Contact: 800-278-7372.

**25-29: UTC Telecom**, sponsored by UTC, The United Telecom Council, Phoenix. Contact: 202-857-1881 or Web site [www.utc.org](http://www.utc.org).

## August

**13-17: Association of Public-Safety Communications Officials—International (APCO) National Conference**, Boston. Contact: 904-322-2500 or Web site [www.apcointl.org](http://www.apcointl.org).

## September

**19-22: Fall Vehicular Technology Conference**, sponsored by IEEE Vehicular Technology Society, Seaport Hotel, Boston. Contact: 904-322-2500.

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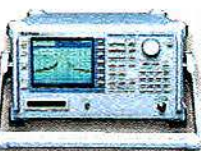
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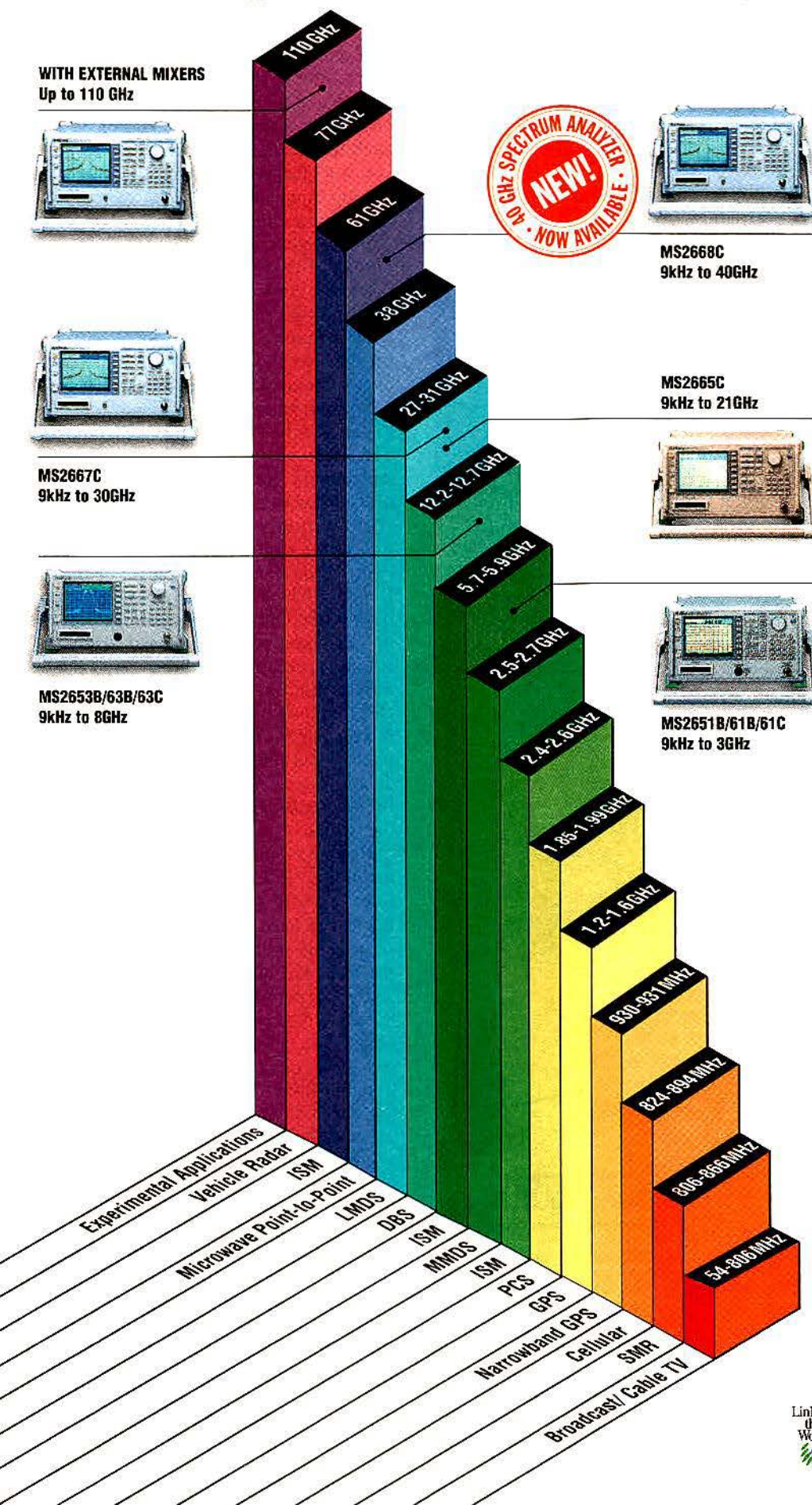
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## Now someone else's eye is on the ball

This issue discusses location technologies, including Global Positioning System (GPS) applications. I confess that recent experience makes me empathize with those fleet drivers and public safety officers who resist this technology. Although GPS is great for managing loss prevention, driver safety and efficient dispersal of resources (read, "vehicles") in the real world, it is also about to thoroughly permeate sports and leisure activities.

In short, it has come to golf.

A recent post-APCO golfing expedition to the north woods of Minnesota culminated at a fine resort with a new course by a renowned designer. (I'll stick to the communications aspects; if you want turf details, I'm sure they will turn up eventually in Intertec's *Grounds Maintenance* magazine.)

Each electric cart on the course comes fully equipped with ball washer, club washer and a full-color, notebook-sized LCD that gives real-time ground-based GPS information on the tee, the pin position and (the cart's) relative location in the vast scheme of things.

Admittedly, the system is captivating. The availability, at a finger-touch, of terrain indications for the hole and precise distances to bunkers, ideal lay-up shot locations and green slope factors gives you slightly better intelligence than Patton had when he went against Rommel. There's even a data-radio link back to the clubhouse so you can order up lunch and beverages ahead of time, saving precious minutes at the turn. Meanwhile, an on-screen countdown clock advises how many minutes ahead of schedule (or behind) you are for completing your round. This will discourage 20-minute searches for lost balls that become ball-hawking expeditions into the woods.

However, with the advantages such technology offers come certain sacrifices, namely anonymity and privacy. It's not too hard to imagine the amusement in the course dispatch center as all the little cart icons traverse the course and yours pauses at regular 30-yard intervals and stops for a protracted period next to the lake. In the old days, "How was your round?" was an honest question. Now, the club pro knows that you know that he knows. Ouch.

So, the last great refuge for four hours of tranquil nature observation and honing of locker-room vocabulary has been thoroughly invaded. The beachhead was established by pagers and cellphones, and now GPS has secured the perimeter.

The good news is that if I get bitten by a snake while chasing a Titleist through the underbrush, my partner can signal them to have the ambulance ready when we get back.

—D. A. Keckler

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SS-18	15	18	1 1/2 x 6 x 9	3.6
SS-25	20	25	2 1/4 x 7 x 9 1/2	4.2
SS-30	25	30	3 1/4 x 7 x 9 1/2	5.0

## DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2 1/4 x 7 x 9 1/2	4.2
SS-30M*	25	30	3 1/4 x 7 x 9 1/2	5.0

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3 1/2 x 19 x 9 1/2	6.5
SRM-30	25	30	3 1/2 x 19 x 9 1/2	7.0

## WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3 1/2 x 19 x 9 1/2	6.5
SRM-30	25	30	3 1/2 x 19 x 9 1/2	7.0

## 2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25A-2	20	25	3 1/2 x 19 x 9 1/2	10.5
SRM-30A-2	25	30	3 1/2 x 19 x 9 1/2	11.0

## WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3 1/2 x 19 x 9 1/2	10.5
SRM-30M-2	25	30	3 1/2 x 19 x 9 1/2	11.0

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KENWOOD TK760H, 762H  
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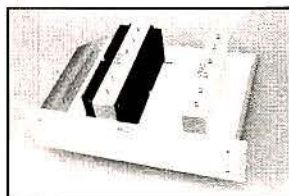
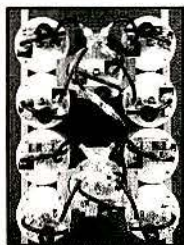
## NEW SWITCHING MODELS

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SS-18GX  
SS-12EFJ  
SS-18EFJ  
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98  
SS-12MC  
SS-10MG, SS-12MG  
SS-101F, SS-121F  
SS-10TK  
SS-12TK OR SS-18TK  
SS-10SM/GTX  
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX  
SS-10RA  
SS-12RA  
SS-18RA  
SS-10SMU, SS-12SMU, SS-18SMU  
SS-10V, SS-12V, SS-18V

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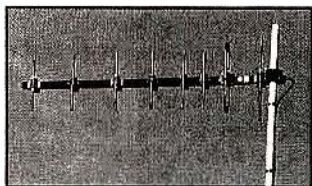


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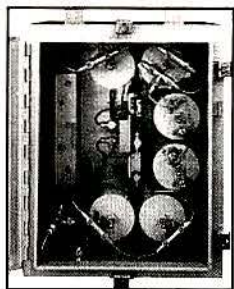
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### IDEN technology note

As a regular subscriber to *MRT* for many years, it is a bit strange that all the "experts" professing opinions and comments about Motorola's IDEN system that Nextel is deploying around the United States do not understand one very important thing about the IDEN technology.

All Motorola base station radios in an IDEN cell site are keyed all the time! The power and emissions are very tightly controlled by datafill parameters in the MSO. The system processes calls and handoffs so fast that *no* base station can key up and handle traffic like analog cellular channels. By the way CDMA is keyed all the time, also.

I just wanted to bring this little fact forward. I wonder why the "experts" haven't noticed this while watching their "spectrum analyzers" with great interest? In many years in the land mobile business, I have found that most often, by a wide margin, most interference issues revolve around receiver performance issues, not transmitter performance issues—most often adjacent channel interference and the lack of adjacent channel rejection.

—Stephen Reynolds  
Network Operations Supervisor  
Nextel Communications

### FCC strives to alleviate work load

Your June 1999 article about the FCC wanting to "Auction Your Privates" was right on. It seems that the FCC will do anything to alleviate its workload. Three examples are the elimination of field studies, the elimination of technician licensing and the closing of field/enforcement offices.

A close second, of course, would be anything to raise money.

A third item would be anything that big business wants. You raised one example (I'd hate to have to "mother-may-I" to Motorola everytime I need spectrum, especially if I were a competitor); another would be that broadcast is exempt from auctions. If my memory serves me, the comments to eliminate technician licensing were 95% against.

It would be interesting to know the ratio of engineers to attorneys at the FCC 20 years ago and today.

—Mark "Doc" Goldman  
Communication Center of Hawaii

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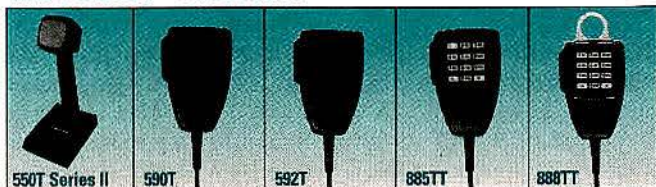


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## What's it worth?

By Robert H. Schwaninger Jr.

In this whirlwind climate of concentration, relocation and trepidation, a question that I'm getting asked a lot is "What's it worth?" For "it," read "my channels," "my towers," "my business," bands of spectrum auctioned by the FCC and more. It's a question with which people wrestle with increasing frequency as operators try to decide their next moves.

Some folks are doing estate planning and want a valuation to decide what to do with a lifetime of amassed assets. Then there are those who are trying to decide whether to sell out or keep going. Other people are trying to get financing for expansion, leveraging current assets for new ones. Whatever the reason, the question is a tough one, but it is approachable.

The problem most operators have is that few people do telecommunications valuations, except those who prepare those mysterious numbers that appear on 10Q reports for publicly traded companies. If you give a large accounting firm enough money, it will find a numerical method for valuing everything. Whether that number has any basis in reality ... well, let's just say that some of the greatest works of fiction can be found on balance sheets.

But because I was getting asked the question by a lot of my clients, I figured that I had better find a way to answer. So, I turned to Michael O'Doherty for guidance. Mike is a CPA. Mike is my CPA. Mike *likes* reading the tax code. Mike likes doing tax returns. Mike is a

very, very dull man. Nice and helpful, but dull.

He explained (I'll give you the shortened version because the actual conversation lasted longer than Steve Forbes trying to explain why he should be president) that a valuation is an opinion, based on a reasonable methodology, gathered facts and good math, that arrives at a number on which people might rely for some purposes. He also pointed out that the person doing the valuation should have some clue as to what he is talking about.

service and became toll takers.)

Having made this learning sacrifice, I was now prepared to perform valuations for my clients. With my sturdy calculator and lexicon of accounting mumbo (not to mention jumbo), I performed my first valuation about eight years ago. Since then, I've done about 200 of them, putting a dollar value on towers, paging channels, whole businesses, SMR channels, microwave systems and more. Clients received my opinion about what a particular group of telecommunications assets were worth. But, what did I discover?

First, I found out why Mike is so dull. The work is mind-numbing. Second, I found out that most people ask the question for the same reason that many people count their chips at the blackjack table. They want some inkling about their economic status. The old, "how'm I doin'" syndrome. Let's face it. After 20 years in the business, people want to know if they're getting ahead and, if so, by how much.

What is surprising to many people is that some things that they consider valuable assets aren't all that valuable, and other things that *are* quite precious are given a shrug by some operators. Here are some examples that might help you decide your next business investment:

► **Spectrum** — Spectrum always has some value because it represents inventory of opportunity, competitive advantage and time (as in the time it takes to duplicate the license). Exclusive spectrum is worth more.

Broadband is worth more than narrowband. Spectrum lying between 150MHz and 1,000MHz is the best, with PCS coming in a close second.

► **Revenue** — Wonderful stuff, this "money." With it you can pay bills, make profit and produce a return on investment. It's also a sign of success: that you have made something out of an opportunity by creating sales. It creates

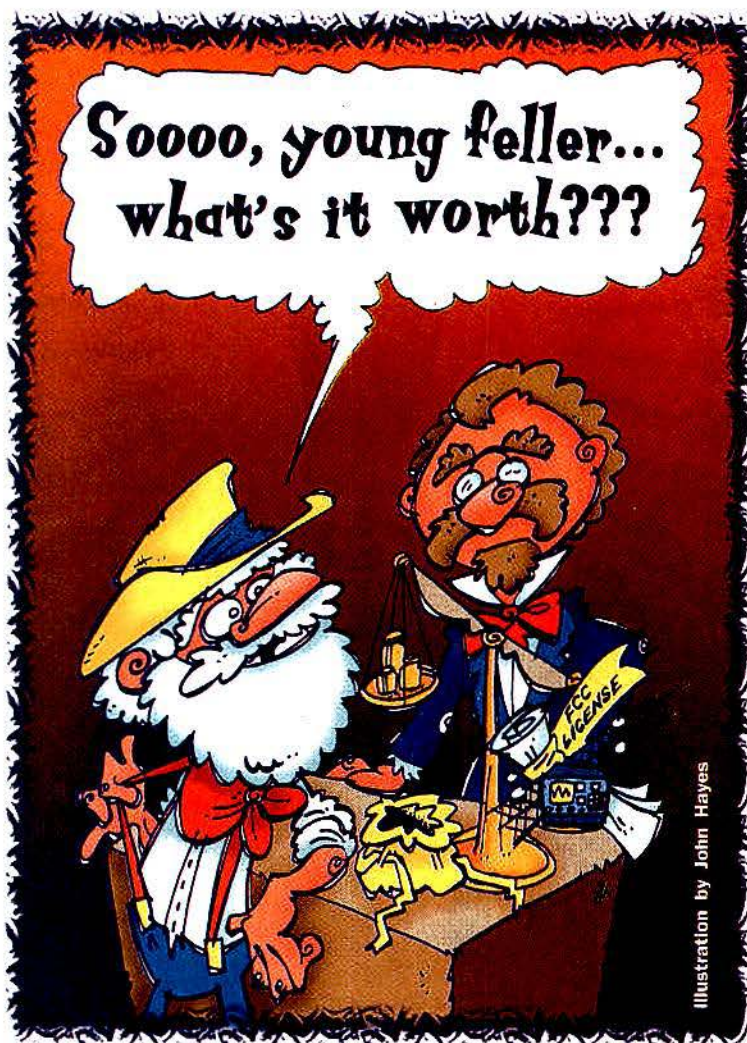


Illustration by John Hayes

I spent many hours with Mike learning about discounted returns on investment, book value vs. good will, and a bunch of other stuff of which only the conversationally challenged speak. (If the FBI had done a CALEA tap on our telephone conversations, there would be some federal agents out there who would have been so bored that they probably quit the

Schwaninger, MRT's regulatory consultant, is the principal in the law firm of Schwaninger & Associates, Washington, which is counsel to Small Business in Telecommunications. Schwaninger is also a member of the Radio Club of America.



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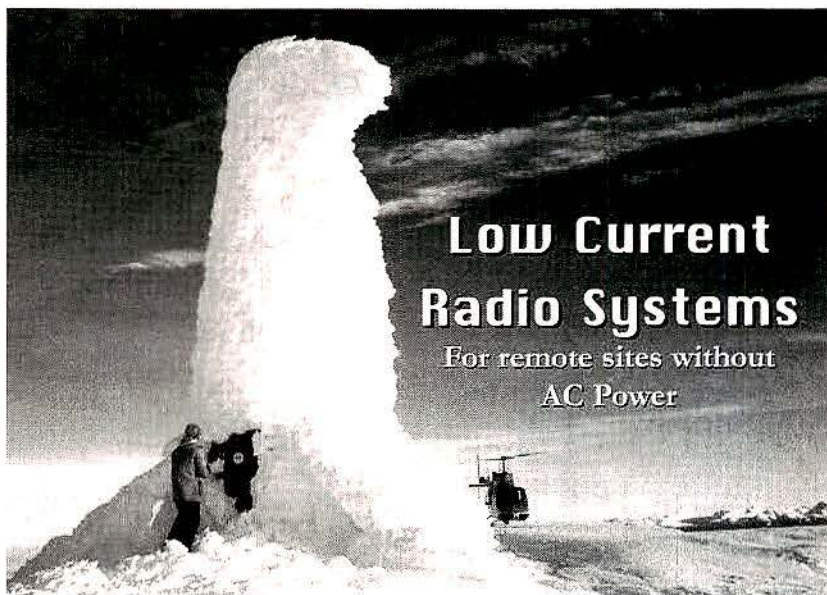


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cash flow against which multiples for determining value can be applied. My advice: Make a lot of this, and you will never be disappointed with a valuation.

► **Equipment** — OK, you need this to use the spectrum and to make the dough. But, I have to tell you, it doesn't mean much in a telecommunications valuation as compared to other stuff. Why? Because today's wonder box is tomorrow's obsolete tinker toy.

► **Location** — I'll take urban over rural most of the time, but not always. You might be surprised at the profit margin made by plenty of rural businesses.

► **Towers** — A separate subject, but a hot market item right now. These should be valued separately from the remainder of the telecommunications business, applying different values for different situations such as a tower company vs. an operator who owns towers.

► **Contracts** — Deals have value, particularly when they are written down. The opportunity reflected in an agreement or series of agreements is often quite valuable.

These are some of the assets that are valued regularly throughout our industry. In combination, the assets are a vital, working, ongoing business for which a financial snapshot may be appropriate to serve the needs of the owner. For example, is it a good time to sell, expand or stand pat?

Businesses, sets of assets and situations are each different. A channel in one part of the country may be worth more or less than a comparable channel in another. Assets are worth more to some buyers than others. The multiples applied to cash flow also vary among industry segments.

Which leads us back to the original question: What is it worth? *Why do you want to know?* The answer to this second question is as important to the valuation task as any other. If the valuation is performed for tax purposes, it might apply different (albeit legitimate) methods than a valuation for sale, purchase, estate planning or financing. The issue is *who* will rely on the valuation, and does that entity normally expect a highly conservative or highly optimistic approach?

There's a line from Kenny Rogers' song "The Gambler" that says "You never count your money while you're sitting at the table." Frankly, that's bull. Ask any gambler about effective use of chips, table stakes and manipulation of antes vs. folds, consideration of betting units and ... well, that's another column. Hey, does anyone want to play poker at the next IWCE in Vegas? ■



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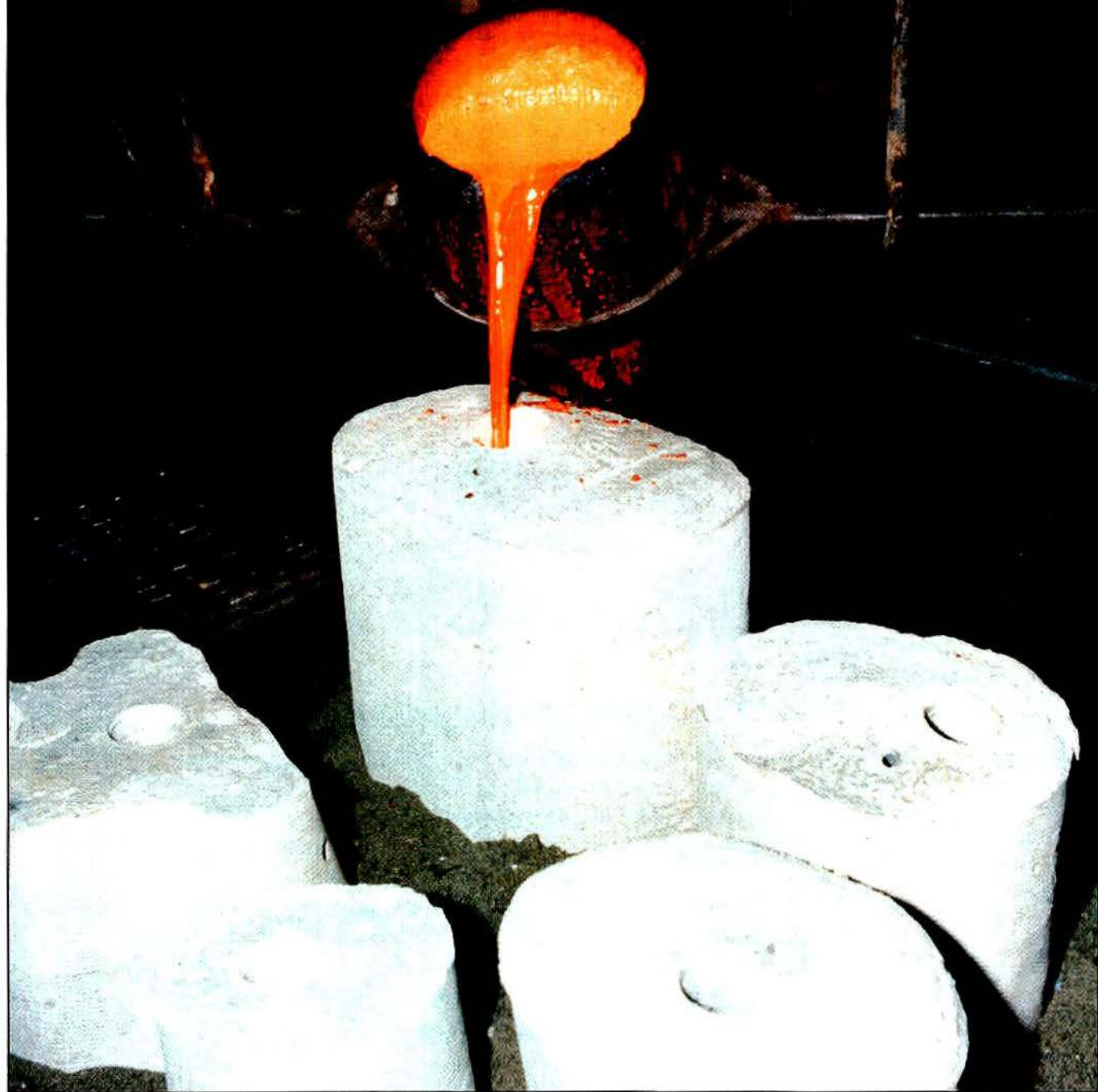
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# Spectrum availability: a molten issue

By Barb Lee

*Refarming is an agrarian analogy; does it translate into a heavy industrial setting? Bethlehem Steel's radio managers speak out.*





Push-to-talk in the steel industry isn't as simple as it used to be. Private radio system operators and the electronics technicians responsible for systems used exclusively by a manufacturing plant or industrial complex need to be concerned with spectrum splitting, frequency overcrowding and the FCC's plans to license offset frequencies. Radio systems managers for one of America's largest industrial concerns are finding spectrum management to be as hot of a topic as a crucible of molten steel.

### The FCC and private wireless

The issue at hand regarding regulation of spectrum management is essentially this: The FCC, in trying to do a balancing act between commercial wireless radio (cellular, PCS, etc.) and private industrial radio, is considering refarming VHF and UHF frequencies to create new narrowband channels. By splitting a 15kHz VHF frequency into two 7.5kHz channels, for example, or a 25kHz UHF frequency into two 12.5kHz (or, eventually, into four 6.25kHz) channels, the FCC creates more radio spectrum for the industry—and more revenue for itself.

To properly use these new frequency assignments, the bandwidth of the radios would need to be reduced to fit within the new allocations. Although refarming is one answer to spectrum overcrowding, it gives rise to two major problems. First, all radios using the frequencies would have to be narrowband. Second, many private radio users that have been using the in-between frequencies (known as "offsets" or "splinters") for their low-power communications on a secondary non-interference basis would run the risk of being stepped on by the newly licensed primary user. Because the licensed primary user has the "right of way," the current offset users would lose those radio paths.

Not only does spectrum refarming increase the number of channels available, it opens the floodgates for use of much-higher-power equipment used in narrowband applications, often causing bleedover and interference. Whereas a neighboring radio user operating wideband radios at 3W may create no problem, that same user operating at 15W, 30W or higher can cause significant interference on adjacent narrowband channels. For certain radio users, particularly private wireless operators whose radio systems are completely encompassed within one to three square

miles, storm clouds are on the horizon. In manufacturing or industrial plant systems, the system manager position has evolved into that of a network coordinator. This individual maintains the radio network as just one small fraction of his everyday duties, which include everything from getting wireline telephone systems installed and operational to maintaining the office computer system.

It is no slight to industrial radio managers to say that many of them simply do not have the time, the wireless background or the expertise to keep abreast of the dramatic developments in telecommunications technology. How, then, are they capable of keeping current with the generally confusing vacillations of Congressional legislative proceedings and the convoluted regulations of the FCC?

### Steelyards and spectrum

Fortunately, some operations have contracted consultants to make certain their operating licenses remain valid, that they are purchasing the radio equipment most suited to their changing needs and that they are meeting current and foreseeable FCC requirements and specifications. Bethlehem Steel, Bethlehem, PA, for instance, handles its radio licensing through Electronic Data Systems (EDS), the steelmaker's information services provider, and is assisted by the legal savvy of Washington telecommunications lawyer Robert Schwaninger and his associates.

However, as Schwaninger (who also writes a column for this magazine) points out, "The majority of on-site people rarely know about FCC regulations, licensing issues and developing protocols that affect their company's system. There are sometimes problems with communicating and coordinating efforts for the purpose of fulfilling emerging opportunities and obligations which arise through changing regulations. For this reason, many of these large industrial concerns are missing the boat on making themselves heard on the subject of spectrum management regulation."

Probably due to its guidance by Schwaninger and EDS, Bethlehem Steel is well on its way to recognizing the seriousness of the refarming issue. One of the nation's largest steel producers, Bethlehem Steel has annual revenues of \$4.4 billion and ships 8.6 million tons of steel each year. The corporation conducts operations for all its business with the aid of some 150 licensed private radio channels. Dozens of frequencies are used in each corporate facility.

Although the corporate headquarters

remains in Bethlehem, steel production operations are now located at Burns Harbor, IN; Sparrows Point, MD; Lackawanna, NY; and three other locations in Pennsylvania: Coatesville, Conshohocken and Steelton.

### Hoosier hot metal

Burns Harbor is situated on Lake Michigan, about 50 miles southeast of Chicago. It is one of Bethlehem's largest divisions, producing hot and cold rolled sheet and plate steel for automotive, construction and other industries worldwide. The Burns Harbor facility employs about 6,000 people who use about 2,000 portable and mobile radios for voice communications, data input, status reports and telemetry. The radio system, using one repeater site, covers the entire three square miles of plant area, including eight main mill locations and their adjacent buildings. The coke oven operation alone comprises 10 to 12 buildings.

Burns Harbor uses some 900MHz channels for data, but the majority of communications is on VHF and UHF. Implementation of the system began in 1965. As with each of the other Bethlehem systems, it was designed primarily for voice communications to maintain safety and to assist in emergency operations: fire, ambulance and security. Now, the private radio system is used not only for voice, but for remote control of equipment, inventory, intermittent and continual status reporting, and numerous other tasks.

Cranes are operated from the ground; locomotives are moved along tracks via radio remote control; slab tracking (assigning casted steel slabs to temporary storage prior to shipment) data is transmitted; and inventories are stored. Many operations are *critical*, not in the usual commercial wireless sense of urgent voice messages, but in the sense of ultra-heavy equipment control and the radio-controlled functions within the steel mills.

Steve Fortin, system engineer for Burns Harbor, believes that frequency refarming causes major concern because most of that plant's radio equipment will not function under the narrowband guidelines.

"Although we have some newer equipment that is programmable to the narrowband frequencies, most of our older equipment is wideband," Fortin said. "Mandatory refarming of frequencies would entail a tremendous cost to us for new equipment."

Burns Harbor now uses a lot of low-powered equipment on splintered

Lee is a telecommunications writer based in North Carolina.



frequencies that are shared within the plant. However, four other steel mills in the immediate area use radios that create interference from time to time.

"It is probable that interference between systems would happen if narrower frequencies are licensed," Fortin said, "and we don't see using commercial cellular or PCS as a real option here in our environment."

Burns Harbor's options, as Fortin sees them, are: Sit tight and hope the offset frequencies don't interfere; implement new narrowband equipment; or obtain licenses for all their frequencies as pri-

mary channels, which the FCC rules is the only way to protect a frequency from being refarmed and used as offset frequencies by outside users. Apart from the first, "head-in-the-sand" option, all other approaches are going to be expensive and disruptive for Burns Harbor.

#### Tidewater tin milling

The Sparrows Point plant, in Baltimore, is located on the Chesapeake Bay. This plant makes hot- and cold-rolled sheets, tin-mill products and galvanized sheet steel (stripped steel that is coated with zinc) in an operations complex en-

compassing more than 2,000 acres—all served by its private radio system. The 4,000 or so employees use 1,500 portable radios, about 500 mobiles and base stations, and six 120W repeaters. About six booster repeaters serve the 50 offset frequencies that are operated inside the plant buildings.

According to Jim Cannon, the senior engineer who handles RF frequencies for the Sparrows Point, the only time their data-transmitting splinter frequencies cause a problem is when they occasionally interfere with a Baltimore repeater that is on higher ground. Sometimes, other repeaters in the area bleed into Sparrows Point when they drift off frequency or are overmodulated, Cannon said. When Sparrows Point causes the interference, "We just flip over to another splinter we use," he said. "We have a good relationship with the four or five other neighboring communications companies in the area, as well, so we've had no problems."

A few units operate on 30MHz lowband VHF; many are in the 72MHz-75MHz midband VHF range; and most are in UHF. The midband VHF frequencies are used for voice and radio control, such as remote control for the 35 to 40 overhead cranes used within the facility. In the last five or 10 years, many radios in UHF have been deployed for use in inventory control. Mobile equipment, such as slab haulers, tractors and overhead cranes, have an onboard terminal that enters data on the computer as the slabs or coils are being transported.

"Almost all our radios have multiple frequencies within them," Cannon said. "We locate personnel or give general directions on a repeater channel and then, so as not to tie that up, we go to our splinter channels to give detailed instruction or to monitor a particular operation."

Cannon's next challenge is to take a look at the different radios being used on the system and to formulate a plan to change the radio systems over to narrowband operation.

"We will probably go through a period of transition where we will be using both wideband and narrowband at the same time," Cannon said. "Our real problem is that we don't really need new radios now, and—if the FCC rulings make it necessary to convert everything to narrowband—we have just one year from the license issue date to load the channels." Cannon said this would require replacing most of the current radios, but the wideband repeaters have to stay in the loop.

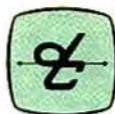
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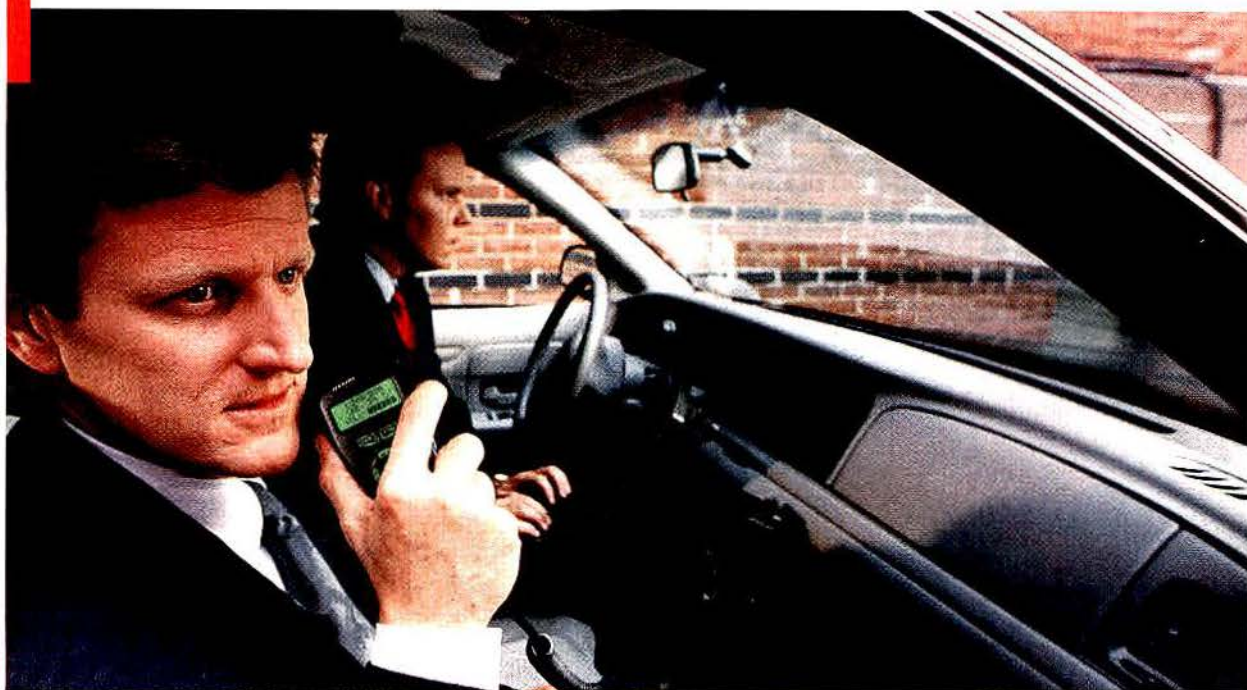


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HT1000 portables, but not with our MX, HT220s or HT600s, which will not switch back and forth from wideband to narrowband on different channels," Cannon said. "Only about 25% of the radios we use are the HT1000 that can handle the dual bandwidth. All others would have to be replaced if we were forced to go to refarmed frequencies."

Although no date has been set for the switch from wideband splinters, Cannon said it is expected by the year 2002, or within a few years after that.

"We know we will have to switch sooner or later," he said. "The primary licensee has priority, and when the narrow-

band people come along, our only choice will be to go to narrowband ourselves to protect our channels." Cannon believes that the FCC follows the lead of telecommunications equipment manufacturers, and because the equipment for full use of the splinter 6.25kHz or 7.5kHz frequencies is not yet available, "looking at those is a bit premature at this moment."

#### Galvanized into action

The Lackawanna, NY, plant produces galvanized steel and operates the coke oven battery, where coal is converted to coke to be used in basic steelmaking. The plant was formerly the second larg-

est Bethlehem Steel facility, covering two or three miles along Lake Erie, south of Buffalo, with 8,000 onsite employees. In 1983 the plant was downsized by the closing of the steel-making operation and later by the selling of bar mill operations to Bar Technologies. The Lackawanna galvanizing operation now employs 800 people who work within the one-square-mile compound lying in two towns: Lackawanna and Hamburg, NY.

The private radio system predominantly uses UHF, with some VHF at 72MHz that is used for industrial operations radio remote control (with no voice traffic), and 153MHz for truck communications (voice only). There are 10 frequencies, 1MHz apart, for data communications, from 460.9125MHz to 469.9125 MHz. The 466MHz band is set aside for in-plant communications, with 16 frequencies used by all technical people and supervisors using portable radios. There are 20 to 30 handheld radios and six mobile radios used as base stations in offices.

According to communications engineer Al Cipriano, the radio system began in the early days of the plant with a few 72MHz channels and evolved as the plant grew. The Lackawanna facility managers requested and obtained UHF frequencies as they needed them, with the 460MHz band used for at least 30 years. As people began carrying handheld radios, Cipriano said, the system became more important.

"When you are repairing a crane inside a mill, and there are people both on the ground and in the air lowering a 5,000-pound motor, you want to make certain those two groups are in continual communications with each other," Cipriano said. "We make sure that no one has a radio programmed in a way that might possibly interfere with crane operations. We are as intent as we can be on not letting any conversation elsewhere in the plant bleed into these conversations and become misconstrued, causing erroneous instructions."

Cipriano is afraid that splinter frequency licensing will allow some of the nearby plants in the Buffalo area to affect their communications, increasing the chance of potentially bad results in critical situations such as this.

Nearby industrial plants, such as the Ford Motor assembly plant and American Axle, have created no radio functionality problems for Bethlehem Steel. Also, because most of the offices and facilities are within steel buildings, transmissions tend not to bleed into

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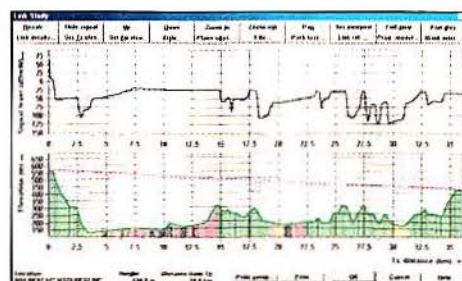
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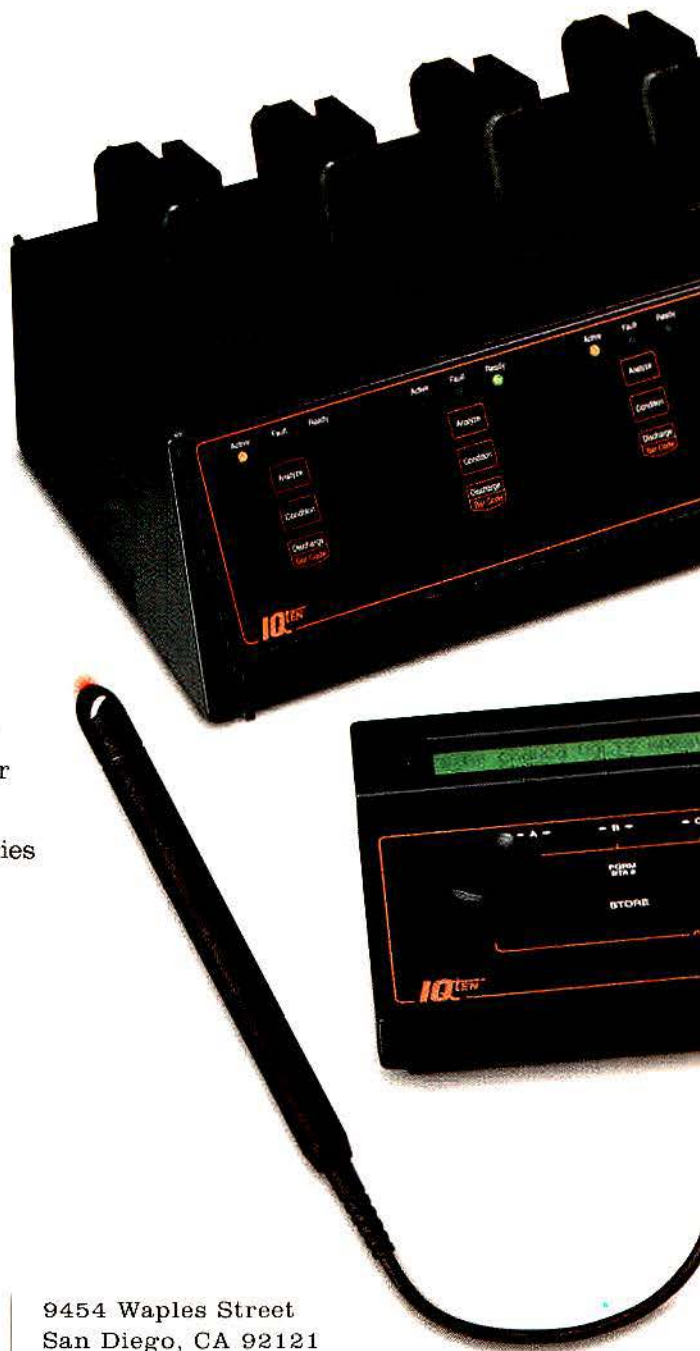


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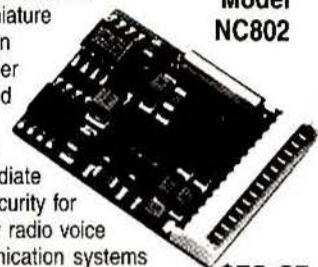
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neighboring radios. With Lake Erie on one side of the Lackawanna plant, and the two cities on the other, there are limited areas for new industries to emerge and obtain licenses for narrowband frequencies, Cipriano said, adding that if the FCC were to issue frequency assignments between Bethlehem's, its wideband radios would interfere.

To date, Lackawanna's only real interference problem came as a direct result of the original plant's earlier downsizing. The coke oven and the galvanized steel operations each gave up some of their frequencies when the bar-mill business was sold. Some frequencies were allocated to the bar-mill operation, and some were returned to the FCC for distribution.

Although the bar-mill plant is situated directly between the galvanized mill and the coke oven facilities, frequencies were carefully calibrated, and there was no overlapping radio noise. However, when the plant was negotiating for the sale of the bar mill, frequencies were a secondary issue not given a great deal of consideration. The galvanized steel division was later surprised to find taxicabs dispatching on "its" frequency. It turned out that the frequency had actually belonged to the coke plant, and it was among those given back to the FCC. The cab company was legally using its licensed frequency with a 100W or so transmitter, much to the dismay of the steel plant's employees.

Cipriano asserts that wideband operation inherently means interference with neighboring narrowband users.

"It costs a lot to make all frequencies primary," he said. "On the other hand, changing out all our radios would be very costly and present quite a problem. We tend to purchase upper-end products from the manufacturer because we want the best, smallest, most durable units available; we have a lot of money tied up in the radios. We are always having to buy more to replace units that have been run over with trucks, fallen into heavy machinery—any number of ways they are destroyed."

Knowing that it takes time for newer equipment to be made market-ready, Cipriano sees "no immediate effect."

"Time will tell how big a problem this frequency refarming becomes," he said. However, reflecting the attitude of most of his colleagues, Cipriano said that whatever changes have to be made will be made, but "there will be a lot of kicking and screaming" over those changes.

### Running off the rails

Pennsylvania Steel Technologies, the Bethlehem plant in Steelton, near Harrisburg, is one of only two rail producers in the United States. Recycled scrap metal is used to charge a 150-ton-per-hour electronic furnace. The resulting liquid steel is poured into ingots or sent to the continuous caster to make flat bars for industrial applications and specialty pieces for rolling into rails.

Although the Steelton plant's radio

system supports just 50 mobiles and 150 portable radios, the operation is spread out over about five miles and employs 1,300 people. Five repeaters are used by the emergency response team and the operating mill. Most radios operate on UHF and are used for remote control of machinery, material tracking, data update on material handling and coding to turn



machinery on and off. Because Steelton is the largest industry in the immediate area, it experiences no current problems with crowded radio frequencies or interference.

### Forging a new plan

Although all may be fine at Steelton and similarly isolated installations at the moment, refarming will eventually affect virtually every manufacturing and industrial facility using private radio. There will be a definite effect not only on users, but also on commercial wireless carriers and on the manufacturers of radio equipment. Whereas commercial carriers and radio equipment suppliers—and the FCC, of course—may reap hefty financial gains from spectrum splitting, the effect on the private radio user is almost certain to be one of financial and efficiency loss. In a huge spectrum management plan, private radio users are the ones who would lose priority. They are, therefore, the most vulnerable. Private industrial radio users, take heed.



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# LMR systems in the military

*Radios used in combat situations are often shelved during peacetime in favor of more traditional VHF systems, which can also be used for remote control operations.*



The U.S. Army's SINCGARS radio is a powerful combat radio used by our forces worldwide, but it has limited applications for peacetime base logistic missions.

By Donald E. Kochler



Staff Sgt. John Phipps shows his skill at teleoperation of the Andros robot vehicle. (See "RF and remote control," page 30.)

Military establishments worldwide use a large variety of specialized radio systems that operate on bands ranging from extremely low frequencies (ELF) all the way to super high frequencies (SHF). These bands are used for tactical, data, SATCOM and other specialized types of communications. Given the tremendous number of radio types and the frequency range open for military communications, why does the U.S. military purchase and use land mobile radio systems? How does this use affect the local users near large installations? How can support businesses profit from this situation?

The U.S. Armed Forces, which I will refer to collectively as the "military" regardless of branch, is careful to distinguish among types of communications.

Contributing Editor Kochler has more than 30 years of experience in radio, telephony and computer electronics. He has been teaching part time at the University of Alaska, Anchorage, for the past four years.

His email address is [afdek1@uaa.alaska.edu](mailto:afdek1@uaa.alaska.edu).



This distinction is often called the "mission." What is the focus of "tactical" and "logistics" communication missions? Tactical communications equipment can generally be classified as those combat systems that must be able to operate in the same unforgiving combat environment as the soldier, sailor or Marine. These MIL-SPEC tactical systems are expensive but well worth the value they offer. They typically carry Army/Navy (AN) nomenclatures, such as "AN/PRC-104."

I have fired up tactical "backpack" HF radios that had been cold-soaked for more than 24 hours in temperatures well below  $-40^{\circ}$ . Despite the cold, the radio could communicate with inbound aircraft hundreds of miles away (aircraft carrying my food, water, ammo and spares, which is why I still think the money is well-invested). However, these impressive radios are expensive, and not everyone in the military operates in a harsh combat environment.

In a less demanding environment, someone had to load and fuel that same aircraft, an activity that requires close coordination for safety and efficiency. These "logistic" communications are carried out in the same environment as that in which LMR

business users perform their daily tasks. There is no need for super-rugged tactical combat systems.

Another factor to consider is cost. The tactical radios mentioned previously cost more than \$8,000 apiece in large numbers (batteries extra), depending on climate. LMR systems, thanks to competition and economy of scale, have much lower purchase prices. The military routinely uses LMR systems for appropriate logistics activities.

#### Competing for frequencies

Most military users operate on the government portion of the spectrum, both VHF and UHF. Rarely do they compete with local businesses for spectrum. Although the radio systems use the same bands, they do not share the same frequency set. The opportunity is present for co-channel interference. I have found military users cooperative in resolving interference issues. As a plus, they may bring sophisticated test or direction-finding (DF) equipment into play to quickly find, then solve the problem.

While at Nellis Air Force Base, near Las Vegas, I ran a large air-traffic control maintenance facility. One day, an AM radio station's signal showed up in the middle of the passband of our

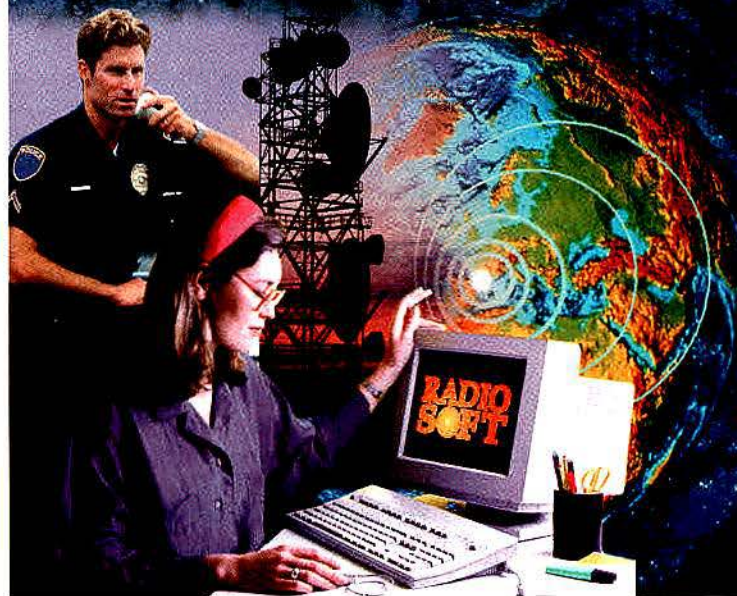


Staff Sgt. William Johnston contacts a fellow EOD team member using a Motorola FRS radio set.



Staff Sgt. Johnston shows the difference in size (and cost) of the radios used by the EOD team in Alaska.

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The trunking system on Ft. Richardson operates on the 406MHz government band, but the equipment should be familiar to civilian users as well.



Some assembly required—Technicians attach cable assemblies to the remote control for the REMOTEC Andros unit. (See "RF and remote control," page 30.)

primary air-to-ground receiver. A second receiver placed online showed the same problem. I quickly built and added a filter to the system feed while we sorted out the problem. (See "Use Coaxial Filters to Reduce Interference," *MRT Public Safety Supplement*, August 1993, page 12.) The culprit was intermod distortion (IMD), caused by a new, off-frequency, paging transmitter in the middle of town mixing within the victim receiver. The offending transmitter was quickly located with sophisticated military DF equipment.

When a military installation uses LMR systems, it generally uses many units. In the previous example, that installation had more than 800 LMR portables and more than 200 LMR mobile sets supported by multiple repeaters and base stations. If you compare such an installation to a city, then you can see

where the same functions would apply: police, fire, and civil engineering for power production and transmission. In fact, because military installations often have support agreements with local communities for firefighting, they try to ensure their communications systems are as compatible as possible with the local civilian jurisdiction.

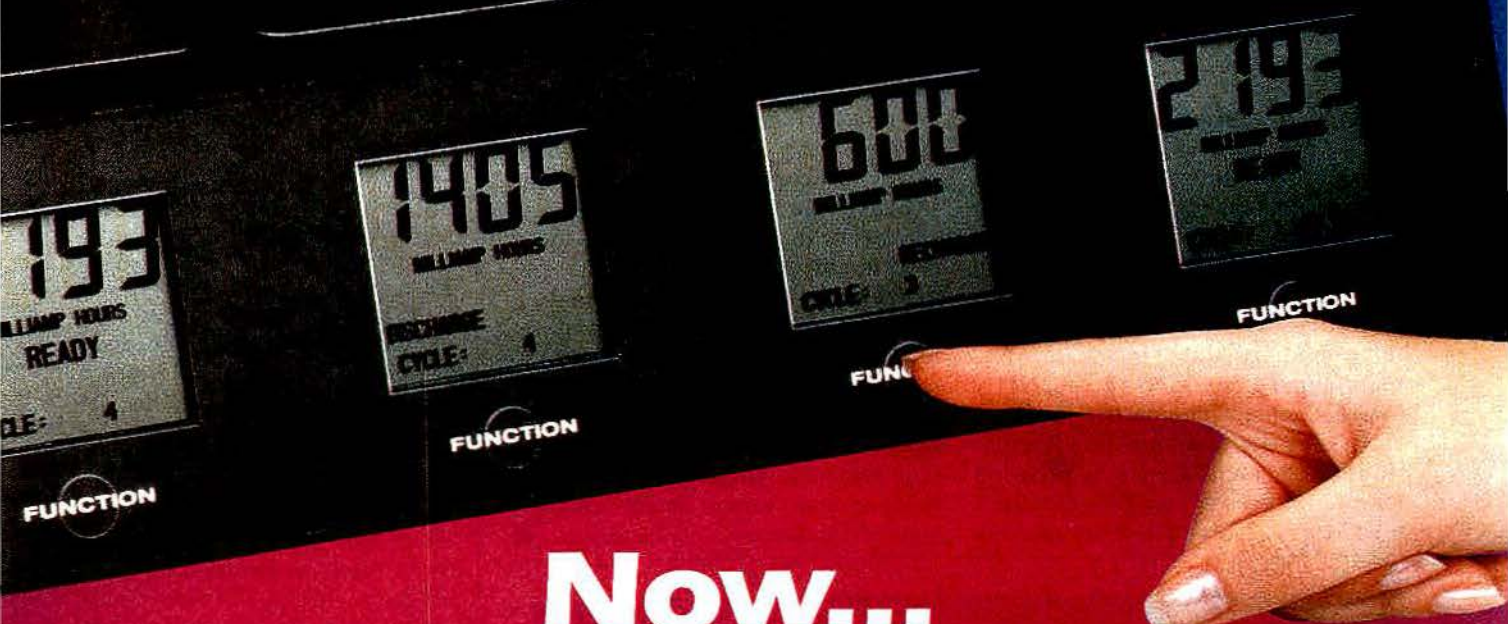
The military uses other systems with traditional LMR frequencies. These may be remote control, area security, SCADA and other specialized systems found in industrial activity. These systems may represent both potential problems and business opportunities. (See "RF and remote control," page 30.)

## Potential service customer

Almost all military installations that use LMR systems outsource the maintenance and installation of these systems.



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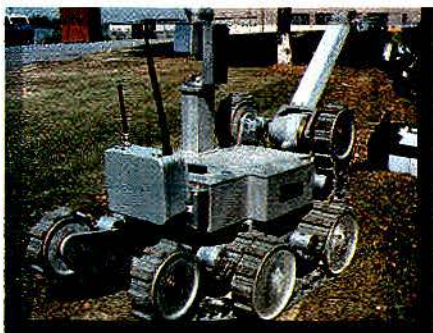
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Not only strong enough to drag an injured person, this robot can carry a 12-gauge shotgun or a .50-caliber blank "disrupter"—and the operator stays at a safe distance.

Military radio maintenance technicians move between bases and tend to focus on the systems they would maintain in a combat situation. Cross-training for the incredible variety of installed systems found around the world would be prohibitively expensive.

Civilian service centers can tap into this potential market. Installation and maintenance contracts are normally awarded under a competitive bid process. The Federal Acquisition Regulations (FAR) and Defense Acquisition Regulations (DAR) are the guidelines used for this process. These contracts are

advertised for bid in the *Commerce Business Daily*, a federal government publication. The *Commerce Business Daily* is also available online at [www.gpo.ucop.edu/search/cbd.html](http://www.gpo.ucop.edu/search/cbd.html), or [cbdnet.gpo.gov/index.html](http://cbdnet.gpo.gov/index.html) for the government version. Use the supplied search engines to search for the key words "LMR" or "maintenance contract." The military also supports a "Procurement Technical Assistance Center" (PTAC) in towns near the larger installations. Check with your local chamber of commerce to see if one is available. If not, see your local Small Business Administration office.

A word of warning: Before you bid on, or accept, any federal contracts, be sure you fully understand all of their vendor/contractor requirements. Talk to someone who has a current contract, or contact the small business office at your local installation procurement unit. Understanding contract requirements is important. For example, the requirements for vendor "certification" (a drug-free workplace, use of recycled paper, etc.) run some 23 pages in the FAR alone. If you are willing to meet these requirements, winning a contract can bring several years of steady work—if your performance is satisfactory. ■

## RF and remote control

The military makes use of "Contractor-Off-the-Shelf Systems," or COTS. One good example is the REMOTEC "Andros" remote-controlled bomb removal robot that is used by the 716th Explosive Ordnance Disposal (EOD) Detachment team at Ft. Richardson, Alaska. The EOD team members can perform the same sets of tasks that are performed by a metropolitan police bomb disposal unit. The Andros is normally used to remove unexploded homemade bombs, a dangerous but necessary job.

The robot (see photos, pages 18-21) is remotely controlled by an RF link set that provides both command for motor control and video for steering the unit. Wire or fiber-optic cable, which would work in an urban setting, will snag on the obstructions typically found in an unimproved area. The robot RF link offers a potential for interference but the members of the 716th EOD team have had no reported problems to date.

All of Alaska is the responsibility of this EOD team (because most Alaskan jurisdictions are lucky to have a full-time police force, let alone a highly trained explosives squad). Short-range, interteam communication is via Motorola "Talkabout" FRS radio sets. This inexpensive and practical solution works well in Alaska. The team also uses regular LMR sets from GE as part of the trunked system found on the post. Operating on the 406MHz government band, these portable radios offer a cost-effective solution for the large area that makes up Ft. Richardson. For work in the Pacific Rim, the team has MIL-SPEC SINCGARS radio sets available for use as well.

Thanks to Capt. Green (USA) and the brave men and women of the 716th Ordnance Company (EOD) for their help and patience in answering questions. I would like to acknowledge the professional work of Staff Sgt. William Johnston in demonstrating the radios used by the team and thank Staff Sgt. John Phipps for the high-speed robot road test. **NOTE:** Mention of specific brand names or types of radio systems or sets is not an endorsement by the U.S. Army or the government.

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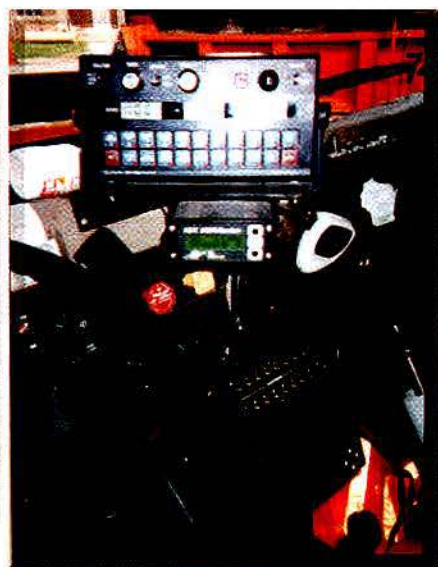
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## Snow and ice go high-tech



**Console Readings**

GroupID: 001-001      Date/Time: 06/21/1999 12:32 PM

Count/Tank Volumes: 1      Prewet Tank Volume: 3  
 Blast Count:      Anticice Tank Volume: 5  
 Granular Tank Volume: 1.1

Status	Sand	SAF	Product 1	Product 2	Prewet	Anticice
Day Distance	2.2	3.3	4.4	5.5	N/A	6.6
Total Distance	7	9	11	13	N/A	15
Day Volume	7.7	8.8	9.9	11.1	17	19
Total Volume	21	23	25	27	29	31
Day Blast Distance	22.2	33.3	44.4	55.5	66.6	77.7
Total Blast Distance	88.8	99.9	111.1	222.2	33	35
Day Blast Volume	333.3	444.4	555.5	666.6	37	39
Total Blast Volume	777.7	888.8	999.9	123.4	41	43

Buttons: [Exit] [Vehicle Info] [Call Data] [Set Rates]

*In Columbia County, WI, fleet tracking of winter road maintenance vehicles puts trucks where they need to be, while remote setting of application rates centralizes control and management of deicing materials applications.*

**Plow Vehicle Info**

Truck Information

GroupID: 001-001      Date/Time: 06/21/1999 12:35 PM  
 TruckID: 12345678      Speed: 9

Granular	Granular Type	Granular Rate	Granular Low Link	Granular Low Tank	Prewet Rate	Prewet Low Link	Prewet Low Tank	Anticice Rate	Anticice Low Link	Anticice Low Tank	Spinner	Spinner Type	Spinner RPM	Spinner Knob	Temperature	Air	Pavement	Alarm Status	Granular Rate	Granular Low Link	Granular Low Tank	Prewet Rate	Prewet Low Link	Prewet Low Tank	Anticice Rate	Anticice Low Link	Anticice Low Tank	Spinner	Spinner Type	Spinner RPM	Spinner Knob	Temperature	Air	Pavement	Alarm Status
Product 1	75.0	75.0	No	No	125.0	No	No	No	No	No	4	4	4	4	75°c	100°c	100°c	Off	75.0	75.0	No	125.0	No	No	No	No	No	4	4	4	4	75°c	100°c	100°c	Off

Buttons: [Exit] [Console Data] [Call Data] [Set Rates]

By John Kruse

Snow and ice removal is a critical public works task in the northern tier of the United States during the winter, vital to keeping the roadways open for commuters, freight transportation and emergency response vehicles. Road departments need to husband their stockpiles of materials carefully to last the entire winter. Overapplication not only diminishes supplies, but can have a detrimental effect on vehicles, the road surface and the environment.

The equipment operators generally

Kruse is president of IDA, Fargo, ND. He can be reached at 701-280-1122.

work in the least favorable conditions: rapidly filling roadways, poor visibility and unpredictable behavior from surrounding vehicles. They must watch the weather, the traffic, the blade activity on the front of the vehicle and the material rates being applied from the back—all while juggling a hand mic for radio communications. Often, coordinators and supervisors at the base do not know where their equipment is, or what it is doing. New technologies can contribute to improvement of this crucial public service.

### 'Smart' snowplows

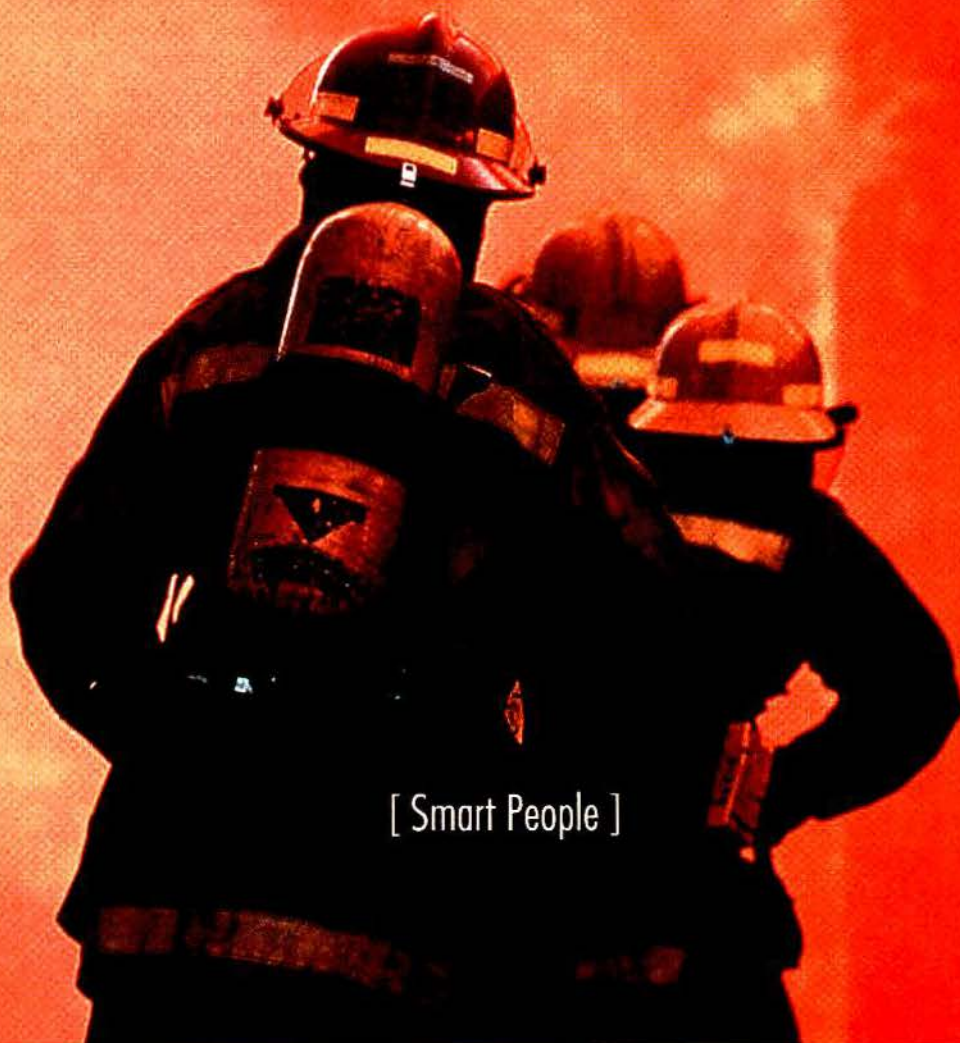
To improve the efficiency, safety and productivity of roadway maintenance, and to reduce costs, a new snow-and-ice vehicle fleet-management system is being implemented for Columbia County, WI. The system not only allows the dispatcher to have direct knowledge of vehicle activity through standard auto-

Above left, snowplows undergo refitting with application management and fleet management control and monitoring equipment, which is tied into the snowplow cab radio system, above right. The screen snapshots above show tracking of the activities.

matic vehicle location (AVL) features, but critical process data also can be communicated between the home base and the vehicle. The system gives the



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tem (AMS 200) and IDA's Trakit GPS/AVL fleet management system. The information communicated by the system includes both snow and ice application data and AVL fleet management data.

#### Application management

The application management system works with Raven's De-ice Control Systems (DCS 700/710) and has been used in road material-spreading applications for several years. This system monitors and regulates the amount of materials and liquids spread onto roadways by snow-and-ice vehicles. The rate of application of these materials can be varied so that only the appropriate amounts are applied, and in the correct locations, based on weather and road conditions. Setting the application management system with the proper application rates provides for more efficient spreading and conservation of materials.

Global Positioning System (GPS) referencing of certain road areas can be used for *prescription application*, which is the variation of material application rates based on GPS location. Managed application of road maintenance materials contributes to greater safety, economy and protection of the environment.

The materials application management system in the driver's cab allows remote changes in material rates.

dispatcher the capability to remotely change road material application rate settings in the vehicle.

Testing of prototypes and installation of the first systems is underway. Commissioner Kurt W. Dey, Columbia County Highway and Transportation Department, is leading the effort to upgrade and modernize the snowplows and material-spreading vehicles used by the county. Monroe Truck and Equipment,

Monroe, WI (Columbia County's vehicle systems supplier), coordinated the creation of the system under the direction of Engineering Specialist Norm LaValla. The location, data and remote control functions supporting the new system are the result of collaboration between Raven Industries of Sioux Falls, SD, and IDA of Fargo, ND. Involved was the technical marriage of Raven's Application Management Sys-

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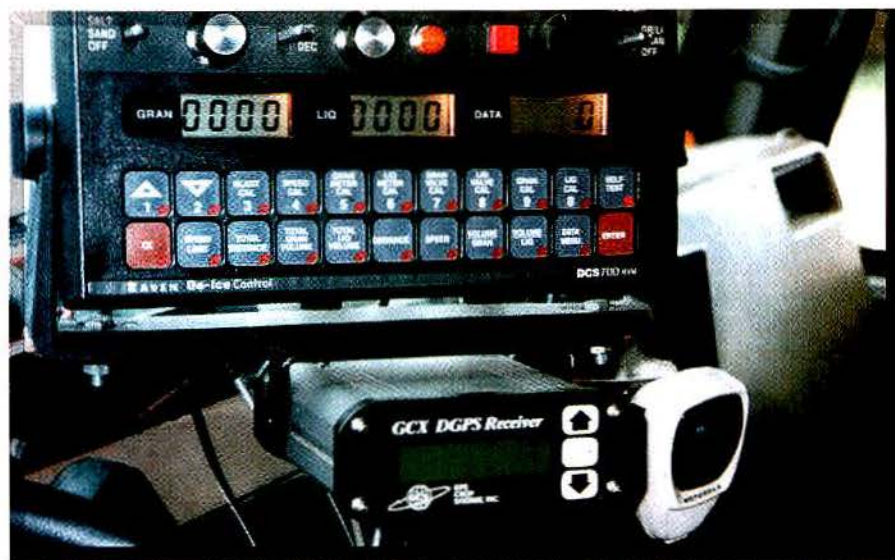


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The GPS-based fleet-management system feeds location data back to the dispatch operation.

#### Fleet management

The GPS/AVL fleet-management system includes an intelligent AVL vehicle unit that communicates by radio to the dispatcher's computer at the central office. Location, time and other data are captured and logged at the vehicle and transmitted to the home base. At the base computer, the fleet-management software module displays and records

the data. Fleet activity can be monitored by observing individual vehicle icons travel across a digitized map.

Location updates can be managed by time interval or by individual inquiries. Activity captured and logged in the vehicle data buffer can be downloaded over-the-air as wireless data to the dispatch computer. Efficient data communications provides for real-time monitor-

ing and direct control of vehicle fleet activity from the home base.

#### Synthesizing functions for dispatch

The new system is more than a piggy-backed configuration of two devices. It is a merging of technologies to perform a coordinated set of functions. The material-application and fleet-management modules are united in the vehicle, each contributing to a common mission. The end result is a comprehensive, real-time depiction of the processing and activity of the snow-and-ice vehicle fleet. The access to current information and the ability for remote manipulation of vehicle settings makes this system a powerful management tool for effective wintertime road maintenance.

The dispatcher can monitor types of materials being spread, rates of application, road-surface temperature and disposition of plows, along with the location, speed and heading of each vehicle. This information is displayed on tabular bars and digital map screens on the dispatcher's computer. The dispatcher has current information on each vehicle in the fleet. A condition may warrant some action to be taken or instruction to be communicated to the vehicle using the system text-messaging feature.

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# Dashboard Database

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Automatic data communication between the vehicle and the home base provides pertinent status information to the dispatch center. It also relieves the drivers from distracting voice communications so they can concentrate on the attention-demanding task of driving and operating the equipment.

Comprehensive, detailed information can be inquired of any vehicle at any time. Historical information can be obtained relating to total distance traveled as well as types and total quantities of road material that have been spread. Calibrations for how much of which material is to be applied can be reviewed. Displays indicate what road material, on which lanes, is being spread.

The blade position of each plow (up, down) can be displayed. The use of the "blast button," which concentrates material at intersections and at other appropriate road areas, can be analyzed. Along with quick at-a-glance status information, the dispatcher has access to real-time, comprehensive and detailed data for individual analysis of each vehicle in the fleet.

#### Automatic alarms

The elaborate alarm feature incorporated into the system will alert

the dispatcher of any detected events or conditions that are outside of preset operating limits. Alarms can be triggered by deviations from prescribed application rates, low tank levels, malfunction of the spinning material spreader apparatus or a driver exceeding a speed limit. Alerts of vehicles entering or leaving predetermined zones can be used for numerous reasons, such as advising the dispatcher of a vehicle going outside of an authorized operating area or for help in scheduling of reloading trucks at the sand and road material stockpiles. The alarm-and-alert feature not only advises the dispatcher of conditions that may affect safety and inefficient operations, but it also enables event-driven management of a large number of fleet vehicles.

Settings in the vehicle can be changed remotely by the dispatcher. Most snow-and-ice vehicles are equipped with a bin for granular material and a tank for liquids. The dispatcher can query the current settings for application rates of granular materials and liquids and can remotely change either or both of those rate settings in the vehicle. This relieves drivers of the primary responsibility for quantities of materials spread on roadways.

Another reason for remote

adjustment of settings is that the home base may have better information on current and forecasted weather conditions that would influence how application rates should be set. Remotely setting application rates provides centralized control and management of road material application. This management tool contributes to cost containment, regulated road material inventory consumption and environmentally conscientious application of materials.

Improved centralized monitoring and control of remote vehicles lessens the reliance and burden on the drivers. With drivers having to steer the truck, manipulate the plows, operate the blast button and perform other tasks simultaneously, any delegation of responsibility back to the home base contributes to safety and effectiveness. New drivers can be acclimated to the job more quickly, and continuity of operation over the entire fleet can be enhanced.

#### Records-based management

Data recorded either in the vehicle data buffer or from monitoring at the dispatch base can be used in a wide variety of ways, including playback viewing and generation of management reports. The reports can be used for route efficiency analysis, asset usage analysis, employee time recording and preventive maintenance data collection. The captured data can also provide excellent detailed documentation of the activity of the fleet for an entire season.

State and local governments have to pay hundreds of liability settlements each year on claims that snow-and-ice vehicles have damaged property or other vehicles on the road. With accurate and undisputable documentation of times and locations of snow-and-ice vehicles, there is a better possibility of refuting unjust or nuisance claims for damages. The ability to analyze fleet activity over long periods of time enables overall usage analysis and can quantitatively substantiate and support future budget requests for additional equipment.

#### Expanding capabilities further

New technologies will continue to be implemented by snow-and-ice vehicle fleets. Innovations planned for the future at Columbia County Highway and Transportation include direct driver access to current weather information and use of video for surveillance of the material-application process. Further advancements in electronics and capacities of onboard computer systems will continue to improve operations. ■

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# Scrutinizing public-safety trunking efficiency

*Upgrading a trunked system to include system management tools allows communications managers to improve their allocations of resources.*

By H. Scot Smith

Managers of today's trunked radio communications systems have at their disposal a greater variety of techniques than ever to help them effectively manage and operate their systems. Data management and analysis, activity reports and other methods of tracking and analyzing system use give managers powerful tools to determine the best usage of their resources. These methods free up busy system administrators to focus on other parts of their jobs.

Until recently, however, it wasn't easy (or even possible, in some cases) to determine how efficiently a trunked radio system was being used. A system manager, administrator or dispatcher *might* have data on the number of push-to-talks (PTTs) over a given channel. But he would need a calculator to prepare a report on usage trends, and any meaningful report would take a great deal of time to generate. And if he wanted to represent any of the data graphically, he'd have to plot the graphs himself.

Advances in system management technology and software now allow public safety agencies, utilities and other radio communications users to upgrade their systems with tools that improve efficiency,

maximize available features and generate all the data they need—in the formats they can use. These methods

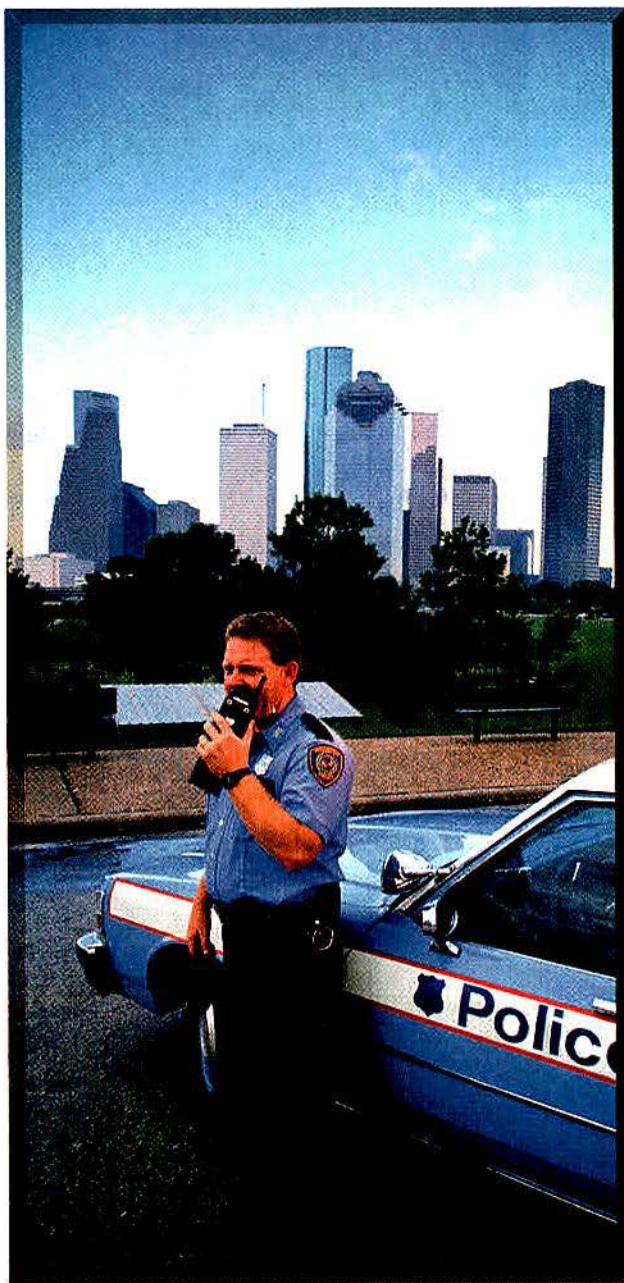
help them plan and manage their communications systems as efficiently as possible.

## Start with what you do know

Where do you start the planning process for improving system management with enhanced data collection and retrieval? A user must first consider the deficiencies that currently exist in system monitoring, reporting and data.

For instance, how difficult is it to take the data on the number of PTTs over a given period and extrapolate some meaningful information? A system administrator needs to know bits of data such as the number of transmissions, the duration of each transmission, the types of groups or users for each transmission and a host of other information.

Data can come from sites, devices, units, groups and channels. Among their many uses, such data allow system administrators to predict when a channel will reach capacity. But even if all the data are there, users that have not upgraded their system management capabilities will have a difficult time making sense of it all—and generating the data takes *time*. The more time an administrator spends on generating reports, the less time he has for other, more valuable activities.



Smith is product manager for systems management, network management, data gateway and PBX gateway products at Ericsson Private Radio Systems, Lynchburg, VA.

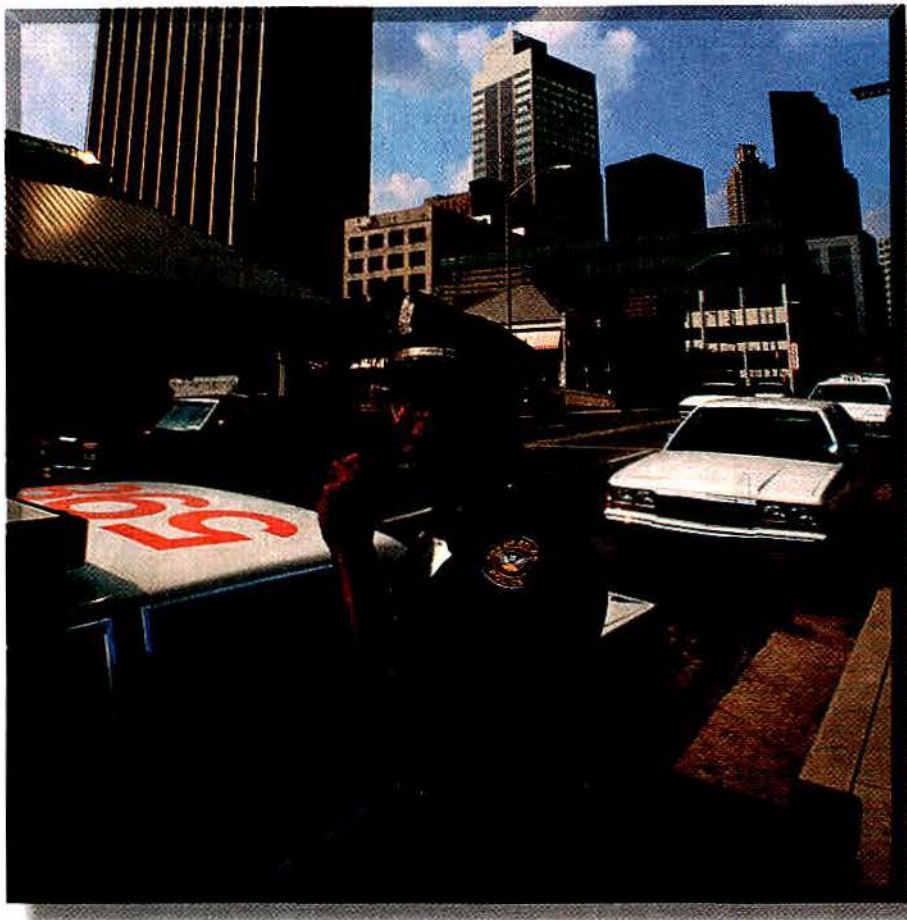


### Massaging the numbers

To generate a readable, meaningful report, the user must take the site controller data logged for each push-to-talk and export it to a PC.

The process begins to bog down at this point because of the lack of off-the-shelf software for radio communications applications. Typically, the user calls in a software expert, either an in-house person or a consultant, to write new code that enables the data to be massaged and interpreted. In many cases a spreadsheet program can be used to keep track of some of the data, but there are severe limitations on data interpretation when a generic spreadsheet program is used.

Data extrapolation isn't the only activity hampered by limitations in system management tools. Often a system administrator or dispatcher needs to make a change "on the fly." One example would be if a police department needed to add individual users to a specific talk group for an emergency such as a hurricane or a forest fire. The latest technology in system management allows such changes, known as *dynamic regroup*, to be made in seconds with the click



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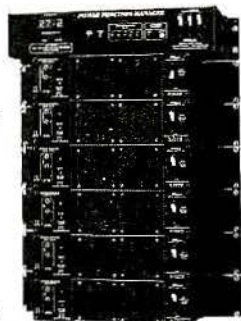
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of a mouse. Other systems have a much longer and more complex process (typically involving bringing the radio back to the shop for alterations) for changing users within groups. Another example of limitations occurs with system monitoring. If a breakdown occurs, only a system with real-time monitoring and alarms would notify the dispatcher or administrator right away.

#### Upgrade considerations

After determining where efficiencies with system management exist, the user must consider the benefits of upgrading to include new technology and software. If these benefits are carefully weighed, the overall improvement in resource allocation that results from having better data, combined with the reduced user training and system maintenance costs, should more than offset the additional outlay of funds necessary to make the upgrade.

Many users initially make the move from conventional radio to trunked radio by installing a system that's *designed* to be upgraded, rather than purchasing the most complete system available. When the need arises for additional capabilities, users can simply enhance their systems without starting over from scratch. This is an opportune time to consider adding equipment and software to enable improved system management and reporting.

#### System design

One enhanced database and reporting system consists of a communications director operating in a client/server environment. A typical platform begins with a server PC with a single client, as well as fully loaded hardware and software. Ericsson Private Radio Systems' system management product, the Communications System Director, includes standard hardware platforms such as: a 450MHz Pentium II processor and a 17-inch color monitor. If additional sites or users need to be added, they can be implemented with the use of a PC for each user. The entire local-area network (LAN) then consists of the server linked to PCs, auxiliary systems, remote sites, management controllers and peripherals. Efficiency is enhanced when industry-standard hardware and software, such as the Windows NT operating system, are used, thereby eliminating the need for

**Often a system administrator or dispatcher needs to make a change 'on the fly,' i.e., if a police department needed to add individual users to a specific talk group for a hurricane or a forest fire.**

proprietary technology.

The ability to create templates—a standard set of features for, say, Group A, and a different set of features for Group B—gives system administrators an additional time-saving

feature. The ability to save time and gain an extra measure of control over the system is a capability many system administrators want. Examples of additional time-saving features include a wizard, which assists in setting up a

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**Efficiency is enhanced when industry-standard hardware and software, such as the Windows NT operating system, are used, thereby eliminating the need for proprietary technology.**

report or template, and mass edit, which allows changes to the entire database through a single action or keystroke.

Through a user-friendly graphical user interface (GUI), the system man-

ager or administrator can set up the system the way it needs to be used. The interface also allows for simple and efficient monitoring of the system in real time, effective database management and easy control of any of

the subsystems that make up the trunked radio system.

#### Using management functions

Operationally, enhanced management capabilities can perform a number of functions for a trunked system including: system and device management, unit group database management, group database management, call activity monitor, report management, activity database management and radio control. GUIs allow all these functions to be accessed through pull-down menus, check boxes and control trees.

Database management, one of the key features of an enhanced system, allows the system administrator to control and manage information critical to system performance. For example, Ericsson's CSD contains three database management processes: unit definition, which assigns each radio an ID number; group definition, which allows individual units to be assigned to groups such as police, fire or emergency medical; and system and device definition, which includes site channel configurations and operating parameters.

Trunked radio system administrators can make use of report management functions to generate significant amounts of data in easy-to-read formats. Detailed information on system activity, performance and efficiency are available through report management. The user can customize the reports or generate reports through default conditions. Report management also allows the user to view, print and store reports as needed. The reports can be printed using a mix of text and graphics.

Radio system management is greatly simplified through the use of these types of tools that are commonplace in other industries but relatively new to private radio. With increasing sophistication of trunked radio and a greater need to manage the system efficiently, the prevalence of easy-to-use system management hardware and software will only grow. ■



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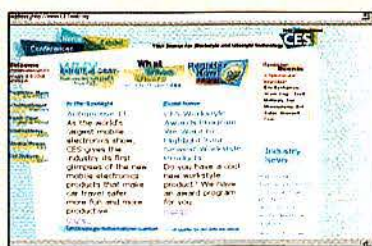
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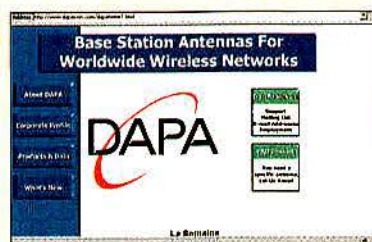
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Doppler provides radio direction-finding systems for use between 50MHz and 1,000MHz. The 5900 series has a remote control and display head for convenient homing operation. The 6000 series comes with BearingTrack software for centralized fixed site control and triangulation. Mobile triangulation is possible using the 6100 series with Autotrack software and GPS.

[www.dopsys.com](http://www.dopsys.com)



## DX Radio Systems

DX Radio Systems offers repeater component sales, complete complex system design, turnkey installation and system commissioning. It provides paging equipment, trunking products and radiotelephone links.

[www.dxradiosystems.com](http://www.dxradiosystems.com)

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**[www.mrtmag.com](http://www.mrtmag.com)**





## EDX Engineering

EDX supplies wireless communications systems design software for SMR/LMR, broadcast, paging, cellular/PCS, LMDS, MDS and WLL. EDX also offers a variety of U.S. and worldwide terrain, building/structure and geographic databases.

[www.edx.com](http://www.edx.com)



## EFJohnson

EFJohnson designs, manufactures and markets trunked and conventional analog and digital radio systems, stationary land mobile radio transmitters/receivers and mobile and portable radios. See the new, affordable Smartnet/Smartzone products on the Web site.

[www.efjohnson.com](http://www.efjohnson.com)



## ICOM America

ICOM's Web site contains information on ICOM radios for land mobile, amateur, marine and aviation, as well as two-way commercial radios.

[www.icomamerica.com](http://www.icomamerica.com)

## IDA

IDA designs and manufactures land mobile radio equipment including trunking controllers, vehicle location systems, dispatch networking equipment, tone and dc remotes, digital trunking remotes, mini consoles, interconnects and DTMF microphones.

[www.idaco.com](http://www.idaco.com)



## iTECH

iTECH (Intelligent Technologies) designs and manufactures single and multistation chargers, analyzers, conditioners and test systems for nickel-based and lithium batteries. Private-label and custom-designed battery systems are available for OEMs of wireless products, as well as battery-test systems and quality-assurance labs.

[www.itecheng.com](http://www.itecheng.com)



## Kenwood Communications

Kenwood Communications is a manufacturer of mobile and portable radios for conventional and trunked operations in government and private industry throughout the world. Kenwood Systems offers custom-designed communications systems for government and business use. Check out the Web site for the new 80 series of mobiles and portables.

[www.kenwood.net](http://www.kenwood.net)



## Maxrad

Maxrad manufactures mobile, portable and base station antennas for 27MHz to 5.8GHz frequencies. This page concentrates on the ISM wireless data products and provides specifications and an option to request a product quote based on specific requirements.

[www.maxrad.com/wirelessdata](http://www.maxrad.com/wirelessdata)

## Newmar

Newmar manufactures communications power products, power supplies, battery chargers, power converters and accessories. The Web site features a full on-line catalog, including a PM/PPM system.

[www.newmarpower.com](http://www.newmarpower.com)

## Norcomm

Norcomm produces data/tone signaling products for two-way radio and wireless communications systems in a full range of formats, including DTMF, DCS, CTCSS, two-tone, digital, voice, scrambling and encryption.

[www.norcommcorp.com](http://www.norcommcorp.com)

## Omnicon Electronics

Omnicon provides products for your two-way radio telephone, supervisory and room recording needs. The Web site covers standard and custom voice-logging recorders along with an extensive selection of accessories.

[www.omniconelectronics.com](http://www.omniconelectronics.com)

## Paging and Wireless Service Center

Paging and Wireless offers new or reconditioned Motorola pagers with monitor and tone alert. The site offers an online directory of radio batteries, accessories and chargers.

[www.pwservice.com](http://www.pwservice.com)





## Premier Communications

The Premier Web site is an on-line source for information on the line of Pryme audio accessories, antennas and battery packs. The site also contains information on the new ADI brand of two-way radio transceivers, which Premier is now importing into North America.

[www.pryme.com](http://www.pryme.com)



## Racal Communications

Racal Communications' Racal 25 radio, a small Project 25-compliant digital portable, provides multi-mode operation and works with existing analog systems. The 16.7-ounce radio is immersible to two meters and features 256 channels, DES encryption and a 10-hour-plus battery with fuel-gauge display.

[www.racalcomm.com](http://www.racalcomm.com)



## RadioSoft

RadioSoft manufactures engineering software for the entire spectrum of radio communications. The strength of the software is accuracy, affordability and ease of use.

[www.radiosoftware.com](http://www.radiosoftware.com)



## Shure

Visit Shure's Web site for everything you need to know about Shure's full line of communications microphones, including the Modulink series, recent product introductions and other sound products.

[www.shure.com](http://www.shure.com)

## Southwest Windpower

The Air Industrial is the latest model of Southwest Windpower's battery charging wind turbines. The turbine is designed to produce alternative power for remote telecommunications and repeater sites.

[www.windenergy.com](http://www.windenergy.com)

## TelePath

TelePath is a provider of two-way radio and wireless communications products. It specializes in all forms of two-way business communications.

[www.telepathcorp.com](http://www.telepathcorp.com)



## Trident Micro Systems

Passport is an enhanced trunking networking protocol from Trident Micro Systems. Passport technology has been licensed by ADI, ComSpace, ICOM America, Kenwood Communications, Motorola, Ritron, SEA, Scholer-Johnson, Tait and Vertex/Standard.

[www.trunking.com](http://www.trunking.com)

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### TX RX Systems

TX RX Systems is a division of the Bird Technologies Group. Visit the Web site for further information on multicoupler systems, signal boosters, antennas, duplexers, cavity filters and RF components.  
[www.txrx.com](http://www.txrx.com)



### Vega

Vega manufactures specialized radio/telephone dispatch control consoles and associated base station adapter panels. Other products include audio processors, audio amplifiers and tone encoder/decoder modules for system applications.  
[www.vega-signaling.com](http://www.vega-signaling.com)

### VoCom Products

VoCom manufactures RF power amplifiers, specializing in power applications for FM-modulated systems. Customers include wide-area paging providers, community repeater operators and state and federal government agencies.  
[www.vocomrf.com](http://www.vocomrf.com)



### W&W Associates

W&W manufactures two-way radio replacement batteries, chargers and analyzer/conditioners. More than 200 charger and analyzer adapter cups are available for land mobile radios, cellphones and laptops.  
[www.wwassociates.com](http://www.wwassociates.com)



## APCO hosts 65th annual conference in Minneapolis

The Association of Public Safety Communications Officials—International (APCO) hosted its 65th annual conference and exhibition Aug. 9–13 in Minneapolis. The show was packed with activities, exhibits and informative educational sessions.

About 256 companies exhibited at this year's conference. As always, the exhibits kicked off with a parade in front of the convention center on Tuesday morning, Aug. 10.

John Walsh, the victims' rights advocate and host of "The New America's Most Wanted," delivered the keynote address.

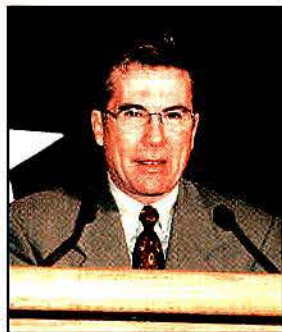
Walsh made complimentary comments about 9-1-1 dispatchers and spoke about his efforts in support of the Victims' Rights Amendment.

Educational sessions ran for four days, Monday through Thursday, with more than 90 speakers presenting information on management, technology, information systems, telecommunicator training and 9-1-1 practices. John Powell of the University of California at Berkeley police department moderated the session on Y2K preparedness. Representatives from Motorola, the California Highway patrol and the St. Paul, MN, police department described preparation and contingency plans. Two "When Terror Strikes" sessions were presented, one

covering the Oklahoma City tornadoes and the other analyzing the Columbine, CO, High School incident.

D'Wana Terry, chief of the FCC Public Safety and Private Wireless Division, moderated a session called, "What Every Licensee Should Know About the FCC." The session covered general licensing and technical analysis processes. The audience had several questions about the antenna structure registration and the letters that the FCC had recently mailed, warning operators and owners to register their towers.

The APCO officers were sworn in on Aug. 12. Thera Bradshaw won the election for second vice president. Bradshaw is the executive director of Regional 9-1-1 Emergency Services in Vancouver, WA. Jack Keating passed the APCO gavel to Joe Hanna, the 66th APCO president. Hanna is captain of the Communications Division of the city of Richardson, TX, police department. Lyle Gallagher, director of communications for the state of North Dakota, succeeds Hanna as president-elect. Glen Nash, senior telecommunications engineer for the California Department of General Services, took the position of first vice president.



Speaker John Walsh receives a standing ovation at the opening session.

## APCO recognizes public safety communicators



Sparks



Vail

APCO saluted communicators in public safety at the conference with its annual awards program. Following are some of the award winners:

Frank L. Sparks, communications technician for the Delaware State Police won the Technician of the Year Award.

The Telecommunicator of the Year award went to Tracy Vail, a telecommunicator and lead call taker for the Illinois State

Police, District 14.

Sue Fallon, shift supervisor for the Minnesota Emergency Communications Center, earned the International Public Safety Communications Line Supervisor of the Year award.

The International Public Safety Communications Center Director of the Year was awarded to Barry M. Mogil, director of Pinellas County, FL, Emergency Communications/9-1-1.



Fallon



Mogil

## APCO quotes

**Dominick Arcuri**, vice president of engineering, Ericsson Private Radio Systems:

"Two-way radio will continue to grow. Public safety has needs that are met by two-way radio. There will be spillovers into two-way radio as advances are made in other technologies."

**Dan Connors**, acting legal advisor to FCC Commissioner Susan Ness, on the 700MHz band:

"The FCC doesn't want to pick a standard [for 700MHz]. We are relying on the NCC and an open process to recommend a standard to the FCC. We don't plan to second-guess."

**Joe Galleli**, Simoco International, on TETRA:

"With the globalization of type approvals, we think that once we decide to provide the data, which may come from several different sources ... the data will go directly to the commission and we can enter the type acceptance process, and it could be over in 60 days. ... Probably before year's end, we'll have type-accepted equipment."

**Thera Bradshaw**, successful candidate for second vice president:

"I want to focus APCO's resources wisely, empower individuals, form partnerships with those who can help us, market APCO worldwide and lead by example."

**Craig Jorgenson** on funding for public safety:

"Traditionally, funding for public safety has been a result of direct appropriations ... In the late '70s those funding sources disappeared. We need to find a new way to fund public safety systems, [by] asking the government, privatization, bonding, borrowing or lease purchasing. One of the basic problems is you have to make that decision early on."

**Gary Oldham**, Lucent Public Safety Systems, on GPS uses in public safety:

"If I dial 9-1-1 from my cellphone in this room, I wouldn't be able to get a signal for help, according to the use of GPS."



## Now a Securicor subsidiary, Intek Global trims payroll by 28

In August, Intek Global, a New York-based company with its largest operating facilities in Kansas City, MO, and Bath, United Kingdom, reduced its U.S. workforce by about 22 positions in Kansas City and about six in the field. The layoff mostly bypassed middle managers and executives and left the Roamer One technical services and customer support almost untouched. The pink slips were handed out shortly after the majority shareholder, Surrey, UK-based Securicor, bought out minority shareholders.

"Staff reductions in the Kansas City office are essential to the continued implementation of the ongoing Intek Millennium Plan which emphasizes focus, efficiency and profitability. ... Intek Global's business plan anticipates aggressive growth of its systems sales business and calls for a transition from a product sales business to a systems and airtime sales business," a statement issued from the New York headquarters reads.

George F. Naspo, the company's executive vice president, heads the Kansas City operations. He said that Intek Global has restructured its products, systems and services business units under

one umbrella, with airtime sales under another. He said that most of the jobs that were eliminated involved manufacturing and were in areas where there were redundancies among divisions.

"You can look at us as having products, systems, services and airtime businesses. Too often we're referred to as 'product and airtime' only. Our systems and services will include 220MHz business and land mobile radio business, all under one umbrella. It's time that the company starts looking at each business segment as part of our full product line rather than each segment as a separate business," Naspo said.

"As for airtime, we're marketing in four major markets, working with the National Rural Telecommunications Cooperative in others and setting up some indirect, third-party resellers who want 220MHz systems throughout the country," he said.

It was in December 1996 when Intek Global achieved a form approaching what it is today. At the time, three companies, Roamer One, Midland USA and Securicor Radiocom, were brought together under the corporate entity then known as Intek Diversified. Under a

previous name, Intek Global first was incorporated in 1969, and at times it has been involved in iron ore exploration, test equipment manufacturing, real estate development and injection-molded plastics. At one time its name was Intercontinental Diamond, reflecting its mining business.

In August of this year, Securicor used a tender offer to purchase the rest of the shares. Intek Global has become a Securicor subsidiary, giving Securicor direct control, where previously it had to exercise control indirectly through its majority vote on Intek Global's board of directors. The name of the company will change to Securicor Wireless. A source close to the company said that Securicor would seek a long-term strategic partner as it continues to expand its North American business.

Intek Global sells products and services under the Intek Global, Data Express, Midland and Roamer One brand names.

For complete details regarding this story and the history of Intek Global, see the Industry News page at [www.mrtmag.com](http://www.mrtmag.com).

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## FCC Notes

### ALJ dismisses all WTB actions against James A. Kay Jr.

With scathing criticism of FCC prosecutorial and administrative practices, on Sept. 7 FCC Chief Administrative Law Judge (ALJ) Joseph Chachkin wiped out five years of Wireless Telecommunications Bureau (WTB) pursuit of California system operator, James A. Kay Jr.

Chachkin held that Kay is qualified to remain a licensee, ordered the WTB to lift the five-year freeze on processing Kay's licensing applications and specifically directed the WTB to coordinate with Kay to update databases relating to his unconstructed or discontinued base stations.

Kay, an operator of more than 150 Part 90 licenses in Los Angeles, became the target of WTB inquiry into his business practices and character qualifications to be a licensee in 1994. The bureau sought to remove licenses from Kay for failure to provide information, violation of construction and operations requirements, failure to construct stations in a timely manner, improper system loading, abuse of administrative process, malicious interference, unauthorized transfer of control, and misrepresentation and lack of candor before the commission.

In his decision, Chachkin said there are limits to information that a bureau may request in the public interest. He characterized WTB efforts as "a fishing expedition." Over the years, Kay was required to produce about 36,000 documents in his defense. The judge found insufficient proof to support inappropriate construction or system loading, and he questioned the credibility of witnesses against Kay relating to abuse of process. The WTB had already dismissed the malicious interference allegations against Kay.

Chachkin's strongest comment related to WTB concealment of information from the ALJ office regarding the improper transfer of control charges. "This judge has never seen prosecutorial misconduct of this magnitude in the 20 years he has presided over commission cases," Chachkin wrote.

MRT regulatory consultant Robert H. Schwaninger Jr. commented, "This is a landmark case on WTB rights and responsibilities in enforcement."

## Zetron acquires Helper Instruments

Redmond, WA-based Zetron has acquired the majority of Helper Instruments' assets, including the rights to the company's name and its products' brand names.

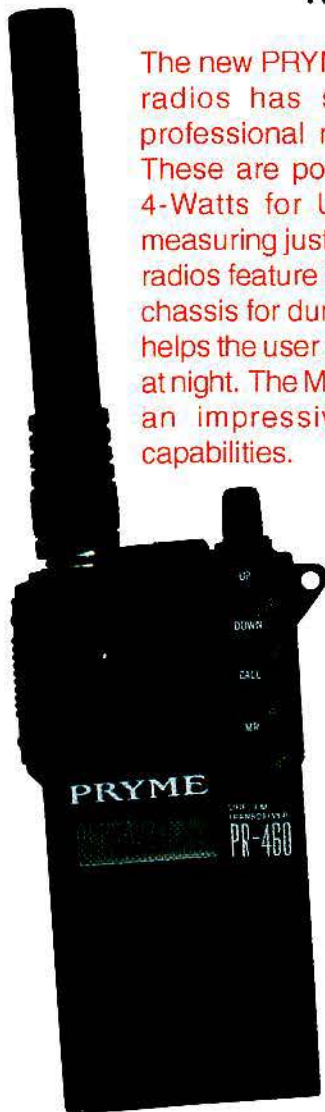
Helper Instruments, Indialantic, FL, manufactures test equipment used by the wireless industry. Major products that were acquired include the Sinadder automatic distortion meter for measuring SINAD sensitivity; the Matchbox series for measuring and tuning antennas; the Lineman for

troubleshooting tone remote systems; and the RF Millivoltmeter for measuring RF circuit performance.

Helper Instruments will continue to sell under its established brand name as a division of Zetron. The products will be manufactured by Zetron's Redmond facility. Mail correspondence to Helper Instruments at 12034 134th Court NE, suite 100, Redmond, WA 98052, or call 800-324-9308 for technical support and sales information. ([www.zetron.com](http://www.zetron.com))

## MicroConnect™

### Two-Way Radios for Work and Play



The new PRYME MicroConnect™ line of two-way radios has something for everyone, from professional radio users to weekend warriors. These are powerful portables (5-Watts VHF or 4-Watts for UHF) that are truly palm-sized, measuring just 4.25" tall (excluding antenna)! The radios feature brass reinforced knobs and a metal chassis for durability, and the back-lit LCD display helps the user keep track of the radio's status, even at night. The MicroConnect™ line of portables offers an impressive combination of power and capabilities.

**ProConnect™:** 99 channel transceivers for conventional Land Mobile and Personal Mobile Radio applications. The ProConnect™ is available in three different frequency ranges: VHF Low Band (38-50 MHz), VHF (136-174 MHz) and UHF (440-470 MHz).

**JobConnect™:** 8 channel transceiver for Job-Site use. The JobConnect™ is available in both VHF and UHF versions and comes with the 8 most popular job site frequencies already installed. Additional or different frequencies are available.

**ClearConnect™ and SportConnect™:** These sporty new radios operate on frequencies within the General Mobile Radio Service, and are intended to be used by families for their own personal communications needs. The SportConnect™ is a 7 channel radio for the casual radio user. The ClearConnect™ is a 23 channel unit with repeater capability for the true GMRS enthusiast.

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## News Notes

Calhoun County, AL, officials cut a ribbon July 15 to celebrate their new **Motorola Astro** radio system. "The final product exceeds our expectations in coverage and audio quality," **Mike Burney**, Calhoun County EMA communications manager, said. ... Larimer County, CO, will use a

**Motorola Astro Smartzone** system as a shared network among its cities and agencies. "We'll operate at peak-level efficiency, but we won't have to invest our own resources to manage and maintain the system," said **Capt. John Walker** of the **Loveland Police Department** ...

"We have a very limited, one-channel, one-transmit site system, and the size and volume have just increased beyond the system's capacity," said **Maj. Glendon Carlton** of the **Lexington, KY, Fire Department**, explaining why the agency chose to use the **University of Kentucky's** existing six-channel 800MHz **Ericsson EDACS** trunked radio system. The university

will use the fire department's VHF site as a backup. ... **Lake County, IL**, has awarded a \$6-million contract to **Ericsson** for a four-site, eight-channel 800MHz **EDACS** system. "We have a lot of congestion on our current radio system and are plagued with interference from other frequency users," said **Garry Gorr**, Lake County communications director. "With the implementation of **EDACS**, we are looking forward to a public safety system that provides portable radio coverage countywide."

The House and Senate have passed bills (S800 and HR438) to make 9-1-1 the universal number for all emergency calls in the United States. The Senate voted on August 6; the House bill passed in February. ... **Berkeley Varitronics Systems**, Metuchen, NJ, has appointed **Navair**, Mississauga, Ontario, as its distributor for Canada. ([www.navair.ca](http://www.navair.ca)) ... Atlanta-based **Dataradio** has completed a private wireless computing network for the **Tulare County Sheriff's Department**, Visalia, CA. "Private wireless networks provide distinct advantages over public wireless

services, giving the user control over the network and maximum bandwidth," said **Phillip Abbate**, Dataradio's western territory manager. Meanwhile, a Dataradio subsidiary, **Johnson Data Telemetry**, Burnsville, MN, has received FCC approval for 25kHz operation at VHF and UHF for its **JSLM telemetry radio**. ([www.johnsondata.com](http://www.johnsondata.com))

**Motorola** has a \$51-million contract to supply the city of Philadelphia with an 800MHz **Astro** radio system. "This system will enable police officers and firefighters, as well as other city departments, to communicate with each other at any time and virtually anywhere in the city," said **Mayor Ed Rendell**. ... **Digital Voice Systems**, Boston, has licensed advanced multiband excitation (AMBE) voice compression software to **ComSpace**, Irving, TX, for use in its land mobile radio systems.



Walker



Gorr



Abbate



Rendell

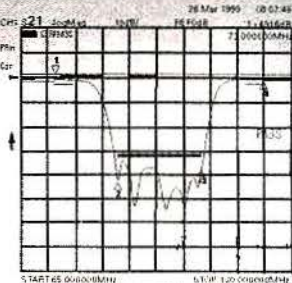
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## TRANSMITTER LOCATION



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## Hand-held radios

### Radios offer programmable channels, high output power

The Tekk NT series of radios offer performance and features at a low price. The NT-20/40 (VHF & UHF) offer 2W of output power, 10 fully programmable channels (not just certain dipswitch frequencies) and other features such as scan, priority scan, full CTCSS/DCS, 12.5kHz and 25kHz. The NT-8/9 offers higher output power (5W) and 16 programmable channels. All NT radios are complete with battery, charger, antenna and belt clip.



Circle (351) on Fast Fact Card

### Radio supports Opensky protocol



The P-801 from AMP Wireless Systems is a software-based, fully digital portable radio that supports the Opensky communication protocol in the 800MHz SMR frequency band. The radio serves as an integrated voice and data communications device. It delivers robust voice communications and enables mobile data networking for an attached portable computer. The radio supports Opensky digital trunking features include voice grouping, priority scanning, pre-emptive

emergency calls, late call entry and dynamic reconfiguration. It performs autonomous roaming for wide-area applications. Optional voice encryption is available for secure communications.

Circle (352) on Fast Fact Card

### Radio meets military standards

Ericsson Private Radio Systems' Panther 500P portable for public safety is a lightweight and compact radio designed to perform in tough conditions. Meeting the military standard 810 E, the radio can withstand 40mph driven rain, temperature extremes from -40°F to 176°F, 48 hours of exposure to salt fog, blowing dust and other environmental extremes. The radio can be programmed from high power to low power to conserve battery life. The channel guard feature provides enhanced privacy. Digital channel guard is also available. The LCD provides a large two-digit numeric readout with icons and is backlit for better visibility in low light.



Circle (353) on Fast Fact Card

### VHF and UHF portables operate on conventional, trunked systems

Kenwood Communications' TK-280/380 VHF and UHF portables are multimode hand-helds capable of wideband or narrowband operation on conventional and trunked radio systems. In conventional mode, the portables offer traditional two-way conventional repeater and simplex operations with priority channel scanning. In trunked mode, one unit can operate on both conventional and LTR trunking systems. The radios also comply with military specs, including the driven-rain spec. The radios also meet or exceed military standards for vibration, shock, humidity, rain, dust, temperature and atmospheric pressure. In trunked mode the radios have a 600-channel capacity, allocating 32-system and 250-group memory capacity to meet system parameters.



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## READERS' CHOICE

Of the new products in the March 1999 Issue, this one generated the biggest reader response. For more information on this product, circle the corresponding Fast Fact Card number on the card found in the back of this issue, and mail the card to us.

### Ear set works in high-noise environments



Using "Talk-thru-your-ears" technology, the CavCom 2000 brings together two-way radio communications with consistent hearing protection in a lightweight ear set and control box. Transducers, embedded in custom hearing protectors, transmit and receive voice commands through air conduction. The ear set can be used for applications within fire and police departments, tactical operations and SCBA applications, and it can be used in high-noise industrial environments. The ear set is also safe for use in petroleum, chemical and other hazardous environments. The ear set and control box work with UHF and VHF two-way radios. Adapters are available for most makes and models. The Kevlar-coated Y-cord eliminates static interference, and it is easily detached from the personal custom ear set.

Circle (500) on Fast Fact Card

### Microwave test set aligns antenna paths



The Path Align-R, model 2200, is a microwave antenna path alignment test set from XL Microwave. The two units weigh seven pounds each and are 3.5" x 8.25" x 13". The receiver section provides 100dB of dynamic range. The transmitter section provides a fixed 0dB output. The test set incorporates an LCD readout of direct path loss with a 0.1dB resolution, updating every 300 milliseconds. The set is powered by a rechargeable lead acid battery to provide at least four hours of operation.

Circle (401) on Fast Fact Card

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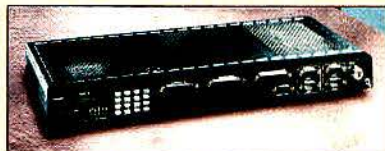


U.S. Patents 5,444,433 - 5,574,999 - D,377,795

Circle (52) on Fast Fact Card



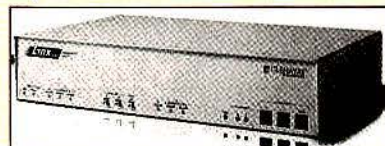
## Radio designed for various networks



The NLITE series of digital microwave radios from **NEC America** is available at 18GHz, 23GHz and 38GHz. It is designed for networks operated by personal communications and cellular service providers, utilities, common carriers, local governments and private users. It incorporates an indoor unit (IDU), an outdoor unit (ODU) and a cable for the ODU-IDU interconnection. The ODU covers the 1DS1-4DS1 and 8DS1-DS3 input ranges.

Circle (402) on Fast Fact Card

## Protection switch operates license-free



The protection switch from **Glenayre Western Multiplex** provides automatic redundant switching for its Lynx.sc family of T1 and E1 spread-spectrum radios. It connects between a set of two Lynx.sc spread-spectrum radios and one antenna at each end of a wireless link to provide monitored hot standby (MHS) protection. The switch is designed to operate in the 2.4GHz to 5.8GHz ISM bands.

Circle (403) on Fast Fact Card

## Kits allow creation of software apps

**Motorola** has launched version 1.2 of the Software Developers' Kit (SDK) for its Pagewriter 2000 two-way pager and Pagewriter 2000X two-way wireless communications center, and its Integrators' Kit for the Creatalink 2XT two-way data transceiver. These latest kits can enable developers to create and develop new software applications for these two-way devices. They can create the applications for the PC, then transfer to and from these devices over their IR ports, as well as applications that populate databases.

Circle (404) on Fast Fact Card

## Cables combine low and high frequencies

The Nu-rad series of radiating cables from **Times Microwave Systems** addresses in-building, subway, transit and tunneling application needs. The cables offer a combination of a surface wave at lower frequencies, along with the generation of a radiating mode at higher frequencies. The combination allows multiple services such as paging, cellular and PCS to be provided on a single broadband radiating cable. They are offered in non-flame-retardant polyethylene, as well as flame-retardant, low-



smoke, non-halogen jacketed designs.

Circle (405) on Fast Fact Card

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Circle (57) on Fast Fact Card



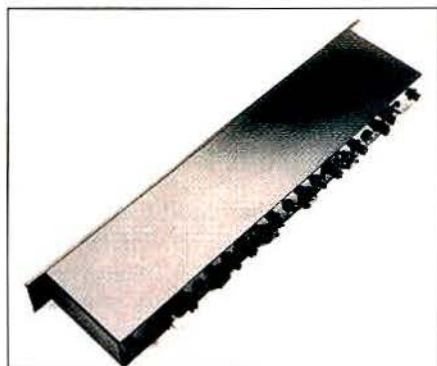
## Grounding system uses electrolyte enhancer

The K-rod electrolytic grounding system from **Electronics Research** provides a stable, low-resistance interface with true earth while minimizing installation area and time. The system is for lightning protection, ac power systems and static discharge and transient currents. It provides stable impedance values, as much as 10 times the conductivity of a driven rod and three times the service life of a driven rod. The copper K-rod constantly con-

ditions the surrounding soil with a self-contained electrolyte enhancer. When combined with moisture, the result is a reduction of resistance between the electrode and earth. The systems are available in vertical and horizontal configurations and in single-piece lengths from four to 20 feet. They are also available with silver solder flange connections that allow continuous lengths to more than 100 feet.

Circle (406) on Fast Fact Card

## Receive filter provides SMR channel filtering



The AMPS receive filter from **Narda West** provides channel filtering in the SMR transmit band. The AFB-21A-8284-07 is designed to pass the AMPS A-Band receive frequencies of 824MHz-846.5MHz and notches out the interference caused by SMR transmit channels. The filter provides greater than 60dB rejection from 851MHz-1,000MHz, and passband loss is 1.3dB maximum. Type N female connectors are standard.

Circle (407) on Fast Fact Card

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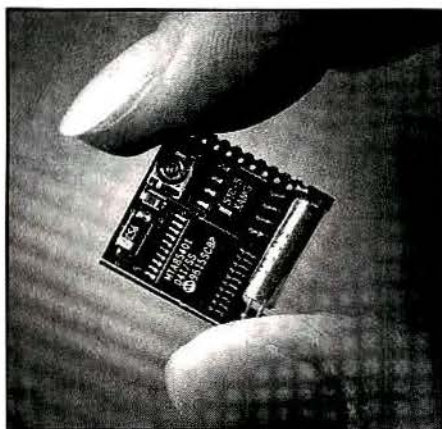
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Circle (49) on Fast Fact Card

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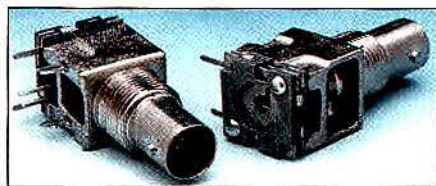
## Helmet mic works in difficult situations

**Ericsson Private Radio Systems'** helmet mics are designed for public safety professionals working in conditions in which helmets, breathing masks and other personal protective gear makes two-way radios difficult to use. Through an agreement with Savox Communications, Ericsson offers a helmet unit (Helmet-com) based on bone conduction that, when combined with the Com-control push-to-talk unit, provides hands-free communication. The unit is compatible with most Ericsson trunked radios. The unit mounts quickly in almost any type of helmet and can be interchanged between helmets.

Circle (409) on Fast Fact Card



## Coaxial connectors provide shielding signal



Amphenol's line of 75Ω BNC/switch coaxial cables is a bulkhead, right-angle BNC receptacle connector combined with an integral switch. The integrated switch actuates when a BNC plug is mated with the receptacle. The connectors can be used in data and telecom equipment to provide a shielding signal and isolated ground signal. The connector is designed for use in systems requiring routing of a signal back into the PC board when the port is not in use.

Circle (410) on Fast Fact Card

## Batteries now support more radio models

The negative pulse reconditioning chargers and pulse analyzer conditioners from **AdvanceTec Industries** charge and condition most NiCd and NiMH batteries in 60 minutes. The line supports additional radios including the Motorola XTS3000, HT750 and HT1250, and the Ericsson/GE LPE200/Prism, MPA and MPD. The units charge batteries to 100% capacity and then switch to negative pulse maintenance mode to prevent overcharging. The single- and four-battery chargers operate in 120Vac office and 12Vdc vehicle environments. The chargers are tested by the Accelerated Life Testing program, which simulates five years of use in the field.

Circle (411) on Fast Fact Card

## Metallic TDR finds small, multiple faults



Model 1270A is a combination metallic TDR from **Riser-Bond Instruments**. It contains front-panel BNC and Banana Jack connectors, and it features a sub-nanosecond pulse width for finding small faults or high-frequency problems. The TDR features a larger LCD display and a pop-up menu system, as well as an auto-search mode, independent cursors and multilevel/function waveform filtering.

Circle (412) on Fast Fact Card

## Base station works in 800MHz band

The IBS-750 from **AMP Wireless Systems** is a software-based, fully digital base station that supports the Opensky communication protocol in the 800MHz frequency band. The base station combines digital voice and data on one RF channel, and its software can be configured to support conventional operation. The software also permits an upgrade to digital operation.

Circle (413) on Fast Fact Card

## ANI, voice scrambler, decoder install quickly

The Maxon versions of **Midian Electronics'** ANI-M automatic number identifier, TVS-2 Micro rolling code voice scrambler, VPU-11 speech inversion scrambler and multifunction universal decoder are boards that can be plugged into the PM-100/160 mobile, the SP-130/140, SP-2000 and the SL-70. The ANI-M is compatible with digital formats such as Motorola's MDC-1200 and MDC-600, as well as GE Ericsson's GE Star and POCSAG paging.

Circle (414) on Fast Fact Card

## Simplified fault locating is in your future.



The TR-3120 is a true step TDR which features a 0.2 ns rise time and a range of over 1.2 GHz. This assures that you will find faults such as bad connectors or bullet holes in coax or twisted pair cables.

The TR-3120 gives you the ability to explore your cable inch-by-inch, showing all impedance changes. A multi-level filter will reduce even the most difficult RF interference cases. Use the RS-232 port for printing benchmark cable curves.

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Circle (51) on Fast Fact Card



## Throat mic works with hazmat apps

The Lash headset's throat mic from **Television Equipment Associates** will not interfere with SCBA masks and hazmat suits. The headset works on practically all portable radios. An optional interface to fire-truck intercoms is available. The mic's elastic strap fits the user's neck like a bow tie, and the receive signals travel through the coiled tube to a skeleton earmold so that peripheral hearing is not obstructed.

Circle (415) on Fast Fact Card

## Console uses double-wide module

**Winsted** has developed a new module for security consoles that is two full bays wide and allows for the use of monitors as wide as 35". The module opening is 24½" x 8¾" and has optional adjustable vertical bars that can be moved horizontally to control the size of the monitor opening. Custom monitor masks are also available.

Circle (416) on Fast Fact Card

## Portable field kit supports mission requirements

The portable field antenna kit from **STI-CO Industries** is designed for communications systems in hotels, buildings or remote areas, in support of operations including high-level parades and emergency hostage crises. The kit contains an integrated set of antennas, cables, mounting fixtures and hand tools required for set-up. The antennas are available in narrowband fixed, narrowband field and broadband frequencies.

**STI-CO** can customize the kit based on customer specifications for center frequencies, including antenna gain, mounting configurations, connector types and cabling and tooling to match customer devices.

Circle (417) on Fast Fact Card



## Controller offers integrated cross-busy function



The model 452 and model 459 LTR-compatible trunking controllers from **Zetron** offer dispatch and inter-

connection to the telephone network using the 450MHz radio frequencies. Both models incorporate "cross-busy" functionality for carriers planning to offer trunking on conventional UHF radio channels.

Circle (418) on Fast Fact Card

## Enhancement allows capture of time report

**Eaton's** Infotach is an enhancement to its Fleet Advisor Transportation Logistics Management System. It provides Fleet Advisor users the ability to electronically capture time histories of vital vehicle information, such as engine and vehicle speed, braking events, idling

and clutch, and cruise control status. The data collected by the unit can be downloaded from the OBC through a PCMCIA card batch transfer, or real-time through the Fleet Advisor wireless communications.

Circle (419) on Fast Fact Card

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Circle (56) on Fast Fact Card



## Guide serves as educational tool

**Riser-Bond Instruments' Product Catalog and Applications Guide** contains a description of the company's product line of time-domain reflectometers (TDR)/cable fault locators, as well as a guide to the use and applications of the TDR. The guide is designed to be used as an educational tool for anyone who uses a TDR.

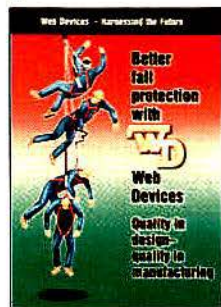
Circle (451) on Fast Fact Card

## Guide aids in selection of cable assemblies

The *Guide to Times Microwave Systems Coaxial Cable Assemblies Products and Capabilities* from **Times Microwave Systems** is a 27-page guide to the selection of coaxial cable assemblies for military and aerospace applications. It offers information on Miltech hermetically sealed cable assemblies, special products and multiport broadband microwave interconnect systems. Electrical performance, operating environment specifications, mechanical installation envelopes and military specification qualifications are also highlighted.

Circle (452) on Fast Fact Card

## Catalog showcases fall protection devices



**Web Devices'** catalog showcases fall protection devices that feature equipment used with towers. The color catalog includes products that have been tested to meet or exceed ANSI and

OSHA standards. The catalog displays full-body harnesses, the Shock-Sorb line of lanyards, roofer kits, ladder systems, double-latch hooks and belts.

Circle (453) on Fast Fact Card

## Online store offers 24-hour access to books

**Government Institutes Division's** ABS Group offers an online store at [www.govinst.com](http://www.govinst.com) that showcases the company's line of more than 500 legal, regulatory and management products and services. The store is open 24 hours a day, and book and software buyers can place confidential orders by credit card

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### Receive only

P30VD, P35VD, P40VD, P45VD	30-35, 35-40, 40-45, 45-50
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P150VD, P160VD, P170VD	150-160, 160-170, 170-180
P150VDA, P160VDA, P170VDA	150-160, 160-170, 170-180
P150VDG, P160VDG, P170VDG	150-160, 160-170, 170-180
P450VD, P460VD	450-460, 460-470
P450VDA, P460VDA	450-460, 460-470
P450VDG, P460VDG	450-460, 460-470
P800VDG, P830VDG, P860VDG	800-830, 830-860, 860-890

### Inline (rf switched)

SP30VD, SP35VD, SP40VD, SP45VD	30-35, 35-40, 40-45, 45-50
SP30VDG, SP35VDG, SP40VDG, SP45VDG	30-35, 35-40, 40-45, 45-50
SP150VD, SP160VD, SP170VD	150-160, 160-170, 170-180
SP150VDA, SP160VDA, SP170VDA	150-160, 160-170, 170-180
SP150VDG, SP160VDG, SP170VDG	150-160, 160-170, 170-180
SP450VD, SP460VD	450-460, 460-470
SP450VDA, SP460VDA	450-460, 460-470
SP450VDG, SP460VDG	450-460, 460-470

Freq. Ranges (MHz)	N.F. (dB)	Gain (dB)	Comp. (dBm)	Device Type	Price
30-35, 35-40, 40-45, 45-50	<1.3	15	0	DGFET	\$ 44.95
30-35, 35-40, 40-45, 45-50	<0.5	26	+12	GaAsFET	\$109.95
150-160, 160-170, 170-180	<1.5	15	0	DGFET	\$ 44.95
150-160, 160-170, 170-180	<1.1	15	0	DGFET	\$ 56.95
150-160, 160-170, 170-180	<0.5	24	+12	GaAsFET	\$109.95
450-460, 460-470	<1.8	15	-20	Bipolar	\$ 49.95
450-460, 460-470	<1.2	16	-20	Bipolar	\$ 74.95
450-460, 460-470	<0.5	16	+12	GaAsFET	\$109.95
800-830, 830-860, 860-890	<0.6	19	+12	GaAsFET	\$119.95
30-35, 35-40, 40-45, 45-50	<1.4	15	0	DGFET	\$ 74.95
30-35, 35-40, 40-45, 45-50	<0.55	26	+12	GaAsFET	\$139.95
150-160, 160-170, 170-180	<1.6	15	0	DGFET	\$ 74.95
150-160, 160-170, 170-180	<1.2	15	0	DGFET	\$ 86.95
150-160, 160-170, 170-180	<0.55	24	+12	GaAsFET	\$139.95
450-460, 460-470	<1.9	15	-20	Bipolar	\$ 79.95
450-460, 460-470	<1.3	16	-20	Bipolar	\$104.95
450-460, 460-470	<0.55	18	+12	GaAsFET	\$139.95

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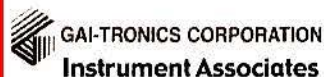
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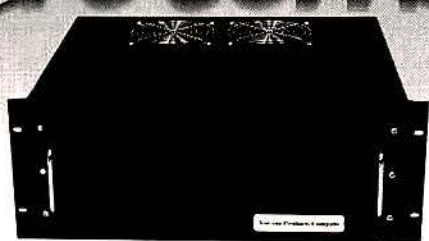
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## people



Howey



Stober



McGee



Johnson

**Patrick Howey**, executive director of Watertown Development, Watertown, SD, accepts the position of administrator on the staff of the National Association of Tower Erectors, Watertown, SD.

**Ty Stober**, national sales trainer for Larsen Antenna Technologies, Vancouver, WA, moves up to national sales manager.

**Wesley McGee**, founder and chairman of CommSite International, Vienna, VA, assumes the position of president of SiteSafe, Arlington, VA.

**Sean Johnson**, manager of U.S. sales for TX RX Systems, Angola, NY, advances to sales and marketing manager.

**Robyn Shalhoub**, senior director of the International Mobile Telecommunications Association, Washington, advances to vice president and deputy director.

**James E. Bunting**, executive vice president and chief financial and operating officer for Intellicell, Chatsworth, CA, accepts the position of chief financial officer for SatCom Systems, Burbank, CA.

**George Benson** resigns from the position of chairman and CEO of Airadigm Communications, Little Chute, WI. He will continue as a consultant and chairman emeritus.

**Carmen Barsu**, applications engineer at Lyncole XIT Grounding, Torrance, CA, accepts the position of secretary and treasurer for the CDEGS 2000 Group Meeting.

**Melinda Ann Krupczynski**, assistant manager of customer service for the National Dispatch Center, San Diego, moves up to manager of customer support.

**Susan G. Swenson**, president and CEO of Cellular One, Northern California and Kansas, assumes the position of president of Leap Wireless International, San Diego, and CEO for Leap's subsidiary, Cricket Communications.

The American Mobile Telecommunications Association (AMTA), Washington, elects eight new members to its Board of Directors, including **Leo Fitzsimon** of Nokia, Washington; **Jim Hopper** of Megahertz Tech, Dallas; **Ralph Haller** of Fox Ridge Communications, Gettysburg, PA; **Robert Shiver** of Intek Global, New York; **Catherine Leonard** of Comtronics, Quincy, MA; **Scott Weisenburger** of Creative Airtime Services, Phoenix; and **Alan Van Velkinburgh** of Houston 2-Way Radio, Houston.

**Charles K. Melby**, sales representative with Melby Communications, Bloomington, MN, wins the 1999 George M. Hanus Award from Maxrad, Hanover Park, IL.



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Dawn Rhoden  
Classified Advertising  
Manager

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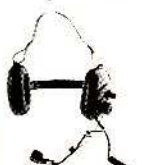
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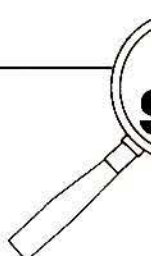
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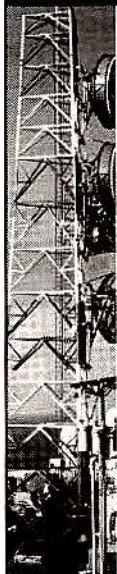
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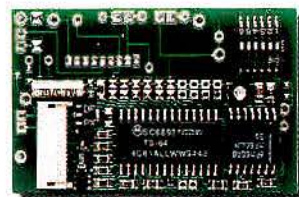




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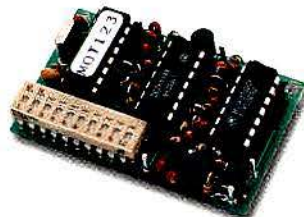
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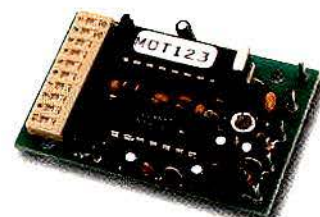
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